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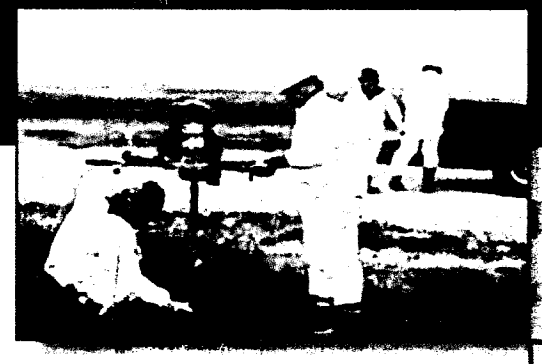

Final

Monthly Landfill Gas Monitoring Report For September 2006 Post Removal Action

Parcel E-2, Industrial Landfill
Hunters Point Shipyard
San Francisco, California

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Innovative Technical Solutions, Inc.

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Final

MONTHLY LANDFILL GAS MONITORING REPORT FOR SEPTEMBER 2006 POST-REMOVAL ACTION

Parcel E-2, Industrial Landfill
Hunters Point Shipyard, San Francisco, California

December 19, 2006

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ACRONYMS and ABBREVIATIONS

§	Section
27 CCR	Title 27 of the California Code of Regulations
BAAQMD	Bay Area Air Quality Management District
BCT	BRAC Cleanup Team
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfm	cubic feet per minute
CIWMB	California Integrated Waste Management Board
GMP	gas monitoring probe
HPS	Hunters Point Shipyard
IR-01/21	Installation Restoration Site 01/21
ITSI	Innovative Technical Solutions, Inc.
KW	kilowatt
LEL	lower explosive limit
MCP	Monitoring and Control Plan
msl	mean sea level
Navy	U.S. Department of the Navy
NMOC	non-methane organic compound
PID	photoionization detector
ppmv	parts per million by volume
PV	passive vent
TCRA	time-critical removal action
Tetra Tech	Tetra Tech EM Inc.
UCSF	University of California, San Francisco

1 INTRODUCTION

Innovative Technical Solutions, Inc. (ITSI) received Task Order CTO-0013 from the U.S. Department of the Navy (Navy), Base Realignment and Closure Program Management Office West, under Contract Number N68711-02-D-8213, to provide technical support at Hunters Point Shipyard (HPS) in San Francisco, California. Under CTO-0013, ITSI is monitoring and controlling migration of landfill gas at the Industrial Landfill in Installation Restoration Site 01/21 (IR-01/21) within Parcel E-2 at HPS (Figure 1). All monitoring is being conducted using the requirements of Title 27 of the California Code of Regulations (27 CCR), Section (§) 20921(a)(2) as guidance. This report contains the results of landfill gas monitoring conducted in September 2006.

Recent investigations at the landfill, the purpose and scope of the monthly monitoring investigation, and the organization of this report are discussed below. Additional information about the site background prior to 2002 is presented in the Final Monthly Landfill Gas Monitoring Report for January 2004 submitted by Tetra Tech EM Inc. (2004a).

1.1 RECENT INVESTIGATIONS AT THE LANDFILL

In 2002, the Navy conducted an evaluation to characterize and delineate landfill gas at the Industrial Landfill as part of the nonstandard data gaps investigation at Parcel E (Tetra Tech EM Inc., 2003). Field personnel surveyed ambient air and soil gas and installed gas monitoring probes (GMPs) that were monitored on a weekly and quarterly basis. Figure 2 shows the locations, including GMPs, extraction wells, and passive vents (PVs), where landfill gas was monitored. The results of monitoring indicated that methane, the main component of landfill gas, was present at levels above the lower explosive limit (LEL; 5 percent by volume in air) at the following locations:

- Subsurface areas in the northern portion of the landfill;
- Above ground in ambient air at four areas within the University of California, San Francisco (UCSF) property (herein referred to as "the UCSF compound").

Additionally, trace amounts of methane and non-methane organic compounds (NMOCs) were detected in the crawlspace of Building 830 on the UCSF compound. The concentrations of NMOCs detected were well below action levels, and did not pose a threat to human health (Tetra Tech EM Inc., 2003). Methane was not detected at GMPs along Crisp Avenue, indicating that landfill gas had not migrated northward beyond the UCSF compound to Crisp Avenue or non-Navy property.

From summer 2002 through May 2003, the Navy conducted a time-critical removal action (TCRA) to address the levels of methane above the LEL on the UCSF compound. The goals of the TCRA were (1) to reduce levels of methane within the UCSF compound to below the LEL of 5 percent, in accordance with the requirements at 27 CCR §20921(a)(2), and (2) to prevent future migration of landfill gas to the UCSF compound. A landfill gas control system, which may be operated passively or actively, was installed to achieve the goals of

the TCRA. The Draft Landfill Gas Time-Critical Removal Action Closeout Report (Tetra Tech EM Inc., 2004b) describes these activities in more detail.

From May through November 2003, the Navy continued monitoring at the PVs (PV-01 through PV-04; PV-05 was installed after November 2003) and GMPs (GMP01A through GMP12, GMP20, and GMP21) along the fence immediately north of the landfill. The draft TCRA closeout report contains a detailed summary of monitoring results, potential migration pathways for landfill gas, and the response actions taken to address the gas migration scenarios, including installation of a grout curtain in selected areas (Tetra Tech EM Inc., 2004b). On November 4, 2003, landfill gas monitoring and control activities were suspended; these activities were resumed on January 21, 2004, when a contract for continued activities was implemented. In September 2004, the Navy revised the Parcel E boundary, and the Industrial Landfill area was given the designation "Parcel E-2" (current parcel boundaries are shown on Figure 1).

In January 2005, the Navy transferred Parcel A to the City of San Francisco. The monthly report text and figures now designate this area as "Non-Navy Property."

1.2 PURPOSE AND SCOPE

This monthly monitoring report presents and summarizes the evaluation of monitoring data that were collected in September 2006. This report was prepared using the requirements of 27 CCR §20934 as guidance. Specifically, this report provides the following:

- Concentrations of methane measured at each GMP and within each on-site structure.
- Concentrations of other gases (specifically oxygen, carbon dioxide, and non-methane organic compounds) measured at each GMP and within each on-site structure.
- Documentation of the dates and times of monitoring activities, and the barometric pressures, atmospheric temperatures, general weather conditions, probe pressures, and water levels measured or recorded.
- Names of sampling personnel, apparati used, and a brief description of the methods employed.
- A numbering system that correlates monitoring results with the corresponding GMPs and other locations monitored.

Documentation of the dates, extraction locations, periods of operation, and any maintenance issues related to operation of the landfill gas control system.

1.3 REPORT ORGANIZATION

This report is organized as follows:

- Section 1 provides an introduction to and an overview of the recent investigations that have occurred at the landfill.
- Section 2 presents the overall objectives and methodologies of the monitoring program.

- Section 3 presents the results of the September 2006 monthly monitoring for landfill gas.
- Section 4 presents an evaluation of these results.
- Section 5 is an overall summary of the monitoring report and current system status.
- Section 6 lists the documents used as background references for this report.

Tables and figures follow Section 6. The following appendices also are included with this report, following the figures:

- Appendix A presents landfill gas monitoring data and depth-to-water data (as recorded on the Landfill Gas Monitoring Log and Water Level Monitoring Log).
- Appendix B provides a summary of other monitoring results for the current reporting period.

2 MONITORING PROGRAM OBJECTIVES AND METHODOLOGIES

This section discusses the objectives and methodologies of the landfill gas monitoring program at HPS Parcel E-2.

2.1 OBJECTIVES

The objective of monitoring landfill gas is to verify that the landfill gas control system at Parcel E-2 is effectively reducing levels of methane to below the LEL and preventing hazardous levels of landfill gas from migrating to the UCSF compound and non-Navy property. Title 27 CCR provides standards for monitoring and controlling combustible gases such as methane. Bay Area Air Quality Management District (BAAQMD) Regulation 8, Rule 34, addresses control of NMOC emissions from solid waste disposal sites.

The landfill gas monitoring and control requirements of 27 CCR and BAAQMD Rule 34 apply to landfills operating under state Resource Conservation and Recovery Act (RCRA) permits. These requirements can be applied to older, inactive, or closed landfills if they pose a potential threat to public health and safety or the environment. The applicability or relevance and appropriateness of 27 CCR requirements to the industrial landfill at IR-01/21 will be evaluated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process. BAAQMD Rule 34 does not regulate the landfill in Parcel E-2. However, both the 27 CCR and Rule 34 requirements were used as guidelines for development and implementation of the Final Interim Landfill Gas Monitoring and Control Plan (MCP) (Tetra Tech EM Inc., 2004c), pending completion of the final CERCLA remedy for the landfill.

Title 27 CCR §20921 sets forth the following three performance standards for control of landfill gases at closed landfills:

1. Concentrations of methane gas must not exceed 1.25 percent by volume in air (25 percent of the LEL) within on-site structures.
2. The concentration of methane gas migrating from the landfill must not exceed 5 percent by volume in air at the property boundary or an alternative boundary approved in accordance with §20925.
3. Trace gases (NMOCs) must be controlled to prevent adverse acute and chronic exposure to toxic or carcinogenic compounds.

The criteria for the first two requirements are clear, but the third requirement does not identify specific field monitoring limits for trace gas concentrations. As a result, action levels for field monitoring of NMOCs were established based on an evaluation of previous risk assessments and Tetra Tech EM Inc. health and safety criteria (Tetra Tech EM Inc., 2002). Tetra Tech EM Inc.'s health and safety criterion limits NMOCs in the breathing zone to 5 parts per million by volume (ppmv). This criterion is applied to on-site structures and utilities that are accessible to workers, and to surface locations on the UCSF compound where landfill gas has been historically detected. These locations include the crawlspace under Building 830.

Previous risk assessments described in the MCP show that subsurface trace gases found in GMPs within the UCSF compound and along Crisp Avenue do not pose an unacceptable health risk (Tetra Tech EM Inc., 2004c). An action level of 500 ppmv was established for NMOCs in GMPs. Historic monitoring results for NMOCs have been below 50 ppmv, an order of magnitude below this action level.

The 5 percent limit for methane at the property boundary (requirement 2 above) does not apply to either passive vents or to monitoring wells located on the landfill. Passive vents are part of the landfill gas migration control system, and frequently exceed 5 percent methane by design. The 5 percent limit does apply at the GMPs, which are located at various distances outside a Gundwall barrier that reduces the outward migration of landfill gases from the trench and passive vents.

The requirements for monitoring and reporting landfill gas, as set forth in 27 CCR, may be summarized as follows:

- Perimeter Monitoring Network (§20925): Gas monitoring probes will be located near the site property boundary, with lateral spacing of no more than 1,000 feet and at depths above groundwater and bedrock.
- Structural Monitoring (§20931): The design of the monitoring network will encompass on-site structures, including buildings, basements, manholes, pipelines, and utility vaults. Methods for on-site structural monitoring may include periodic monitoring using either permanently installed probes or gas surveys, or continuous monitoring systems.
- Monitoring Parameters (§20932): All gas monitoring probes and on-site structures will be monitored for methane, and for trace NMOCs if required.

- Monitoring Frequency (§20933): At a minimum, quarterly monitoring is required. More frequent monitoring may be required at locations where monitoring results indicate that landfill gas is migrating or is accumulating in structures.
- Reporting (§20934): Results of landfill gas monitoring will be submitted to the California Integrated Waste Management Board within 90 days, provided compliance levels are maintained. When compliance levels are exceeded, the results must be submitted within 5 days. A letter that describes the nature and extent of the problem and any immediate corrective actions that must be taken to protect public health and safety and the environment will be submitted within 10 days.

Portions of the landfill gas control system, and some of the current monitoring points, are on property that the Navy has transferred to UCSF. Negotiations occurred between the Navy and UCSF regarding the property that contains the landfill gas control system, resulting in the creation of an easement which allows the Navy to maintain and monitor its facilities. The easement was finalized on July 21, 2006.

2.2 MONITORING METHODOLOGIES

Each month, landfill gas is monitored to evaluate migration from the landfill to verify that the landfill gas control system is achieving the regulatory requirements set forth in 27 CCR §20921 and BAAQMD Rule 34. This section briefly discusses the procedures used to monitor landfill gas during the September 2006 monitoring event. The MCP (Tetra Tech EM Inc., 2004c) provides a more detailed discussion of monitoring procedures.

A CES-Landtec GEM 2000 landfill gas meter was used to monitor concentrations of methane, oxygen, and carbon dioxide; the percentage of the methane LEL; and real-time temperature and barometric pressure. A calibrated Mini-RAE Plus Classic photoionization detector (PID) with a 10.6 electron-volt lamp was used to monitor NMOCs. A Gilian GilAir air-sampling pump was used to purge the GMPs prior to monitoring. Pressure in the GMPs was measured using a Magnehelic pressure gauge.

Before soil gas readings were recorded, pressure was measured at the GMPs using a Magnehelic pressure gauge with a scale of 0 to 10 inches of water. The air pump was then connected to the sampling port of the GMP and used to purge air from the GMP for at least one minute at 3,000 cubic centimeters per minute. After the GMP was purged, the GEM 2000 landfill gas meter was connected to the sampling port. Readings were recorded when concentrations of landfill gas were stable for at least 30 seconds. Background levels of NMOCs were recorded from the PID by recording the ambient air reading before the meter was connected to the sampling port. After background levels of NMOCs were recorded, the PID was connected to the sampling port to measure NMOCs. Concentrations of NMOCs were recorded when the PID indicated a stable value for at least 30 seconds.

Table 1 identifies the sampling personnel and the equipment used during monitoring. Table 2 lists the monitoring locations by category.

2.2.1 Active Gas Extraction Schedule

From January 27, 2004, to August 28, 2004, gas extraction along the landfill gas barrier wall (see Figure 2) was performed semi-continuously (i.e., except for brief shutdowns for maintenance) at PV-02 and PV-03, and occasionally at GMP24 as needed. The active gas extraction system was inoperable from August 28, 2004, to September 29, 2004, due to a power outage at the electrical service drop (see Section 2.4). During this time, the system was passively venting from PV-01, PV-02, PV-04, and PV-05. PV-03 was not vented during this time.

Active gas extraction was resumed at PV-02 on September 29, 2004, and continued until October 7, 2004, along with extraction at GMP24 from September 30, 2004, to October 4, 2004 (ITSI 2005a, 2005b). In the months of October 2004 through February 2005, active extraction was performed continuously at PV-02 for one full week just prior to the monthly gas monitoring event.

Because of concerns that an extraction schedule limited to one week per month might allow landfill gas to migrate off the site during the rest of the month, when extraction was not occurring, the active gas extraction schedule was changed in March 2005. The revised protocol called for active gas extraction to be performed for 40 consecutive hours each week.

Beginning in May 2005, monthly gas monitoring events were performed following a period of several days during which there had been only passive extraction and just before the active extraction system was activated, so that the data collected represented the presumed worst-case conditions of the extraction schedule. This practice has been suspended temporarily due to the continuous (24 hours a day, 7 days a week) active extraction schedule adopted on February 8, 2006 (see discussion below).

Beginning in October 2005, passive vents PV-01, PV-03, PV-04, and PV-05 were closed off during any active extraction at PV-02, to maximize the efficiency of methane extraction from the interception trench. These vents were re-opened when active extraction was concluded. This practice was discontinued in December 2005 because of concerns that closing the vents may put undue vacuum pressure on the interception trench. The vents are now left open at all times.

Beginning on February 8, 2006, and continuing through September 2006, active gas extraction at PV-02 has been conducted on a 24-hours-a-day, 7-days-a-week schedule in order to control methane levels in the interception trench and in fence line GMPs more effectively. This schedule was adopted when it was determined that the 40-hours-per-week active extraction schedule was no longer sufficient to control methane migration to the fence line GMPs (particularly GMP-01A and GMP-07A).

During the month of September 2006, active gas extraction was conducted at PV-02 as follows:

System On at PV-02	System Off at PV-02	Hours Run	Notes
2/8/06, 1430	Ongoing	720.0	Active extraction ongoing through September
Total September Operating Hours:		720.0	

2.3 DATA EVALUATION

Results of landfill gas monitoring for September 2006 were evaluated against the performance standards and action levels for methane and NMOCs outlined in the MCP (Tetra Tech EM Inc., 2004c), based in turn on the performance standards set forth in 27 CCR and BAAQMD Rule 34. Section 3 summarizes the results of landfill gas monitoring in September 2006.

2.4 DEVIATIONS

Following the damage to the electrical service drop which left the landfill gas control system without power from August 28, 2004, through September 28, 2004, temporary power was supplied by a portable generator until the permanent power source for the active control system was restored on March 27, 2006, as noted in Section 3.1.5 below.

All of the extraction well and electrical vaults that had been monitored as on-site structures were excavated and removed by a Navy contractor between September 2005 and January 2006, and therefore could not be monitored during the September 2006 event. It is not yet known if these structures are to be replaced.

At some point between the April 2006 and May 2006 monitoring events, well IR74MW01A was damaged by construction crews working on the non-Navy property along and north of Crisp Avenue formerly known as HPS Parcel A. IR74MW01A was repaired on September 8, 2006, but has remained inaccessible due to construction activities and therefore was not measured for static water level during the September monitoring event. It is anticipated that monthly water level readings at IR74MW01A will be resumed beginning with the October 2006 monitoring event. Landfill gases are not monitored at IR74MW01A.

Three ambient air locations within the UCSF compound (Ambient Location A [fence line], Ambient Location B [basketball court], and the light pole) have been removed from the monitoring program. The MCP states, "This MCP recommends that the three UCSF surface locations be removed from the monitoring program after methane and NMOC levels have remained below action levels for 6 consecutive months from the date of this MCP" (Tetra Tech EM Inc., 2004c, Section 3.2). As no methane or NMOC detections had been reported at any of these locations in more than two years, these locations were removed from the monitoring program, pursuant to the MCP (and as discussed at the August 2006 BRAC Closure Team meeting), as of the August 2006 reporting period, and will no longer be listed

or discussed in the monthly monitoring reports, provided active extraction at the collection trench is performed for a minimum of 40 hours per week. If active gas extraction drops below 40 hours per week, or if methane or NMOCs are detected at other locations on the UCSF compound, monthly monitoring will be resumed at these ambient locations.

3 MONITORING RESULTS

This section presents the results for monthly monitoring at the landfill during September 2006, based on monitoring measurements and depth-to-water readings recorded on September 25–28, 2006. Section 3.1.5 discusses operation and maintenance of the landfill gas control system. Appendix A contains the Landfill Gas Monitoring Log and the Water Level Monitoring Log for the September 2006 monitoring event. Appendix B summarizes the results of landfill gas monitoring at locations other than those specified in the MCP (Tetra Tech EM Inc., 2004c). These locations, specifically the groundwater monitoring wells on the landfill cap, are being monitored monthly to further evaluate the relative rate of gas generation in the landfill.

3.1 METHANE RESULTS

This section summarizes the results of methane monitoring for the September 2006 monitoring event. Figure 2 shows the locations that were monitored; the September 2006 results for methane (excluding passive vents and the wells listed in Appendix B) are shown on Figure 3 and Figure 4. Table 3 presents the methane results for each MCP-specified monitoring location. Note that all methane concentrations are provided in percentage of methane by volume.

The subsections below present the results for monitoring locations in the following areas:

- the fence line between the landfill and the UCSF compound,
- the UCSF compound,
- Crisp Avenue, beyond (north of) the UCSF compound,
- structural locations, and
- the landfill gas control system.

The fence line between the landfill and the UCSF compound is considered the property boundary for the landfill gas monitoring program (Tetra Tech EM Inc., 2004c), which is of significance for reporting the monitoring results consistent with Title 27 CCR §20921 (see section 2.1 above).

3.1.1 Fence Line

Concentrations of methane in the GMPs along the fence line north of the landfill (GMP01A through GMP12, GMP20, and GMP21) are representative of concentrations of methane migrating from the site boundary. During the September 2006 monitoring event, methane was not detected in any fence line GMP, and thus the regulatory performance standard of less than 5 percent (%) methane by volume and the HPS site action level of 2.5% were met at all fence line GMPs. Therefore, no extraction or followup monitoring was necessary. Figure 3 and Table 3 show the results for methane at GMPs along the fence line between Parcel E-2 and the UCSF compound.

3.1.2 UCSF Compound

On September 25, 2006, methane was detected in one of the UCSF compound GMPs (GMP24) at 1.7 percent (%) by volume. This concentration was lower than the regulatory performance standard of less than 5% methane by volume and the HPS site action level of 2.5%; therefore, no action or followup monitoring was necessary. Methane was not detected at any other UCSF location. Figure 3 and Table 3 show the methane monitoring results for GMPs within the UCSF compound.

3.1.3 Crisp Avenue

On September 25–28, 2006, methane was not detected in any of the GMPs along Crisp Avenue (GMP13 through GMP19 and GMP27 through GMP32), thereby meeting both the regulatory performance standard of less than 5% and the HPS site action level of 2.5%. Figure 3 and Table 3 show the methane monitoring results for these GMPs.

3.1.4 Structural Locations

On September 25, 2006, methane was monitored at the crawlspace at Building 830 within the UCSF compound and at the remaining on-site utilities locations (i.e., catch basins DP1 and DP2). Methane was not detected in any of the on-site utilities or in the crawlspace at Building 830 in September 2006, thereby meeting both the regulatory performance standard of less than 5% and the HPS site action level of 2.5%. (The crawlspace at Building 830 is being monitored by the Navy because of its close proximity to the landfill.) Figure 4 and Table 3 show the methane monitoring results for these locations.

As noted in Section 2.4, three ambient air locations within the UCSF compound (Ambient Location A [fence line], Ambient Location B [basketball court], and the light pole) have been removed from the monitoring program as of the August 2006 reporting period, and will no longer be listed or discussed in the monthly monitoring reports, provided active extraction at the collection trench is performed for a minimum of 40 hours per week.

3.1.5 Control System

On September 25, 2006, concentrations of methane at the landfill gas control system (passive vents PV-01 through PV-05) ranged from a high of 60.7% by volume at the PV-04 hydrosil location to 0.0 percent by volume at PV-03. Table 3 presents the results for methane from monitoring locations at the landfill gas control system. As Figure 19 of the MCP specifies that temperatures at the control system vents be less than 55 °C (131 °F), these temperatures also are monitored during monthly monitoring events, and the readings are documented in Appendix A. The 55 °C limit has not been exceeded since monitoring began in 2004.

On June 19, 2006, the first carbon drums were replaced at PV-01, PV-05, and the PV-02 active extraction trailer. As a precautionary measure, the carbon was changed out due to recent data indicating the approaching saturation of the first carbon drums at the three PVs listed above. A second carbon drum is present at each passive vent and helps to ensure that NMOCs are not emitted to the environment by venting from the extraction system; no detectable NMOCs have been emitted in recent months (in Table 4 see data for "Effluent" position at each PV). The second-position carbon drums were moved to the first position at the three PVs, and new carbon drums were placed in the second position.

As documented in the August and September 2004 monthly reports (ITSI 2005c, 2005a), the landfill gas control system was without power from August 28, 2004, through September 28, 2004, due to damage to the electrical service drop caused by workers at the Golden Gate Railroad Museum yard (see Section 2.2.1). A mobile generator was brought on site on September 29, 2004, and was employed as the power source for active extraction until PG&E power was restored in March 2006.

In June 2005, PG&E approved a revised power installation plan to provide temporary power for three years. The plan included installing two power poles, coordinating a power drop and meter installation with PG&E, terminating unused conduits, and removing an existing power pole that was no longer needed. Following Navy approval of the cost proposal for the performance of this work in December 2005, and PG&E approval of the final plan for the installation work in February 2006, the new power poles were installed on February 28, 2006. PG&E made the power connections on March 24, 2006, and power was restored to the active extraction system on March 27, 2006.

3.2 TRACE GAS RESULTS

During the September 2006 event, NMOCs were well below action levels at all monitoring locations. (Action levels are: 500 ppmv at GMPs, 5 ppmv within Building 830, 5 ppmv in on-site utilities, 5 ppmv in ambient air [recorded in the breathing zone], and 100 ppmv for two consecutive days from the outlet [effluent] of the control system.) Table 4 presents the monitoring results for NMOCs during September 2006. Figures 10, 11, and 12 show the historical results for NMOCs at GMPs at the fence line, on the UCSF compound, and along Crisp Avenue, respectively, for each monitoring event from September 2005 through September 2006.

Due to a previous problem with the PID pump (as described in Section 3.2 of the March 2006 Monthly Report [ITSI, 2006]), a pre-monitoring field check of the PID vacuum pressure was performed along with the regular field calibration to verify that the instrument pump was functioning properly. It was determined that the PID was creating sufficient vacuum to generate correct, accurate readings.

On September 25, 2006, NMOCs were not detected in any of the fence line GMPs. NMOCs were detected in one of the UCSF compound GMPs (GMP24 at 1.2 ppmv). NMOCs were detected in three of the Crisp Avenue GMPs (GMP17 at 1.3 ppmv, GMP19 at 14.6 ppmv, and GMP32 at 6.8 ppmv). However, as all concentrations were well below the HPS NMOC action level for GMPs (500 ppmv), no action or followup monitoring was necessary.

NMOCs were monitored at three locations at each of the PVs: at the influent, after the first carbon canister, and at the effluent (or Hydrosil) canister. NMOCs were detected in the PV-02 influent at 1.7 ppmv, in the PV-03 influent at 0.7 ppmv, and in the PV-05 influent at 2.3 ppmv (see Table 4 for all results). NMOC concentrations at all PV carbon drum and outlet (effluent) locations were at background levels (0.1 ppmv), well below the 100-ppmv action level for the effluent of the control system.

NMOCs were not detected above background in any of the structural monitoring locations during the September 2006 monitoring event.

During the September 2006 event, oxygen concentrations in all GMPs on the UCSF compound and most of the GMPs along the fence line were significantly below the standard atmospheric concentration of 20.9 percent. Oxygen values in these areas ranged from 0.3 percent by volume (at GMP24) to 13.8 percent (at GMP26) in the UCSF compound GMPs, and from 0.5 percent (at GMP08A) to 19.8 percent (at GMP10) along the fence line. Twelve of the 14 fence line GMPs had less than 18.5 percent oxygen.

Concentrations of oxygen reported in the other monitoring areas were closer to the standard atmospheric concentration. Oxygen concentrations at GMPs along Crisp Avenue were between 15.4 and 21.3 percent by volume. Oxygen is not regulated under 27 CCR or BAAQMD Rule 34, but low concentrations of oxygen in soil may be associated with landfill gas. Table 5 presents the monitoring results for oxygen during the September 2006 monitoring event.

During the September 2006 event, carbon dioxide concentrations in the GMPs closest to the landfill (i.e., those along the fence line and on the UCSF compound) ranged from 1.0 to 14.1 percent by volume, significantly above the standard atmospheric concentration of approximately 0.04 percent (400 ppmv). Carbon dioxide levels in the GMPs along Crisp Avenue, farther from the landfill, were lower, ranging from 0.0 to 2.2 percent by volume. Carbon dioxide is not regulated under 27 CCR or BAAQMD Rule 34, but carbon dioxide concentrations frequently are elevated where landfill gas is present. Carbon dioxide monitoring results are presented in Table 6.

3.3 PROBE PRESSURE

Measurement of air pressure at the GMPs helps assess whether landfill gas is accumulating, and can provide information about the influence of the extraction system on reducing any increases in the generation of landfill gas. On September 25–28, 2006, gauge pressure at the GMPs (pressure in the probes relative to atmospheric pressure) was measured using a Magnehelic pressure gauge. No probe pressure was detected in any of the GMPs during the September 2006 event. Table 7 presents the probe pressure readings recorded at GMPs during this monitoring event.

3.4 WATER LEVEL RESULTS

Water level measurements are recorded to confirm that the bottom of the landfill gas barrier wall is below the top of the saturated zone, and is preventing landfill gas from migrating underneath the barrier wall. Water level measurements also provide information about the thickness of the vadose zone, as the lower boundary of the vadose zone is determined by the elevation of the water table.

On September 25, 2006, water levels were measured at the GMPs along Crisp Avenue (GMP27 through GMP32) and at 10 additional groundwater monitoring wells and piezometers. Water levels were measured as depths below the tops of well casings. Subsequently, these measurements were converted to depths below ground surface and to elevations relative to mean sea level (msl) using surveyed elevations. Table 8 shows the measured water levels and the converted values. Water levels also are shown on tables 3 through 6 for comparison with GMP screened intervals. As noted above in Section 2.4, well IR74MW01A was damaged by construction crews working on the non-Navy property along and north of Crisp Avenue formerly known as HPS Parcel A. IR74MW01A was repaired on September 8, 2006, but remained inaccessible during the September monthly event due to construction activities, and therefore was not measured for static water level.

Figure 5 shows the groundwater potentiometric surface of the A-aquifer (shallow groundwater zone) on September 25, 2006, and the elevations of the bottom of the landfill gas barrier wall at these locations. Groundwater generally flows to the east and southeast from the non-Navy property north of Parcel E-2 toward San Francisco Bay and to a groundwater sink near the northern end of the boundary between Parcels D and E (east of the monitored area shown on Figure 5). The water level readings for September 25, 2006, indicate that the bottom of the barrier wall, which ranges in elevation from -1.2 feet above msl (i.e., 1.2 feet below msl) to 1.9 feet above msl, was submerged below the water table at all locations monitored.

As discussed in greater detail in Section 4, there appears to be an inverse relationship between methane concentrations and groundwater elevations at GMP24 (which generally is the GMP with the highest methane concentrations). In general, the lower the groundwater elevation near GMP24, the higher the methane concentration at GMP24. Figure 13 illustrates this relationship. The opposite relationship appears to exist for methane

concentrations and groundwater elevations near GMP01A and GMP07A, where detected concentrations of methane have been reported only in the wet season (see Figure 14).

3.5 METEOROLOGICAL DATA

Meteorological data are used qualitatively to evaluate whether changes in weather affect the behavior of landfill gas. For example, a rapid decrease in barometric pressure may affect the amount of landfill gas that is released, and temperature may affect the rate of landfill gas generation. In addition, precipitation and the elevation of the water table influence the volume of the vadose zone, and may influence the potential buildup of pressure behind submerged probe screens.

Meteorological data are collected from an on-site station located southeast of the landfill cap at an elevation of about 25 feet above msl (see Figure 2). The location of the meteorological station is considered representative of the HPS area because data collection is not limited by proximity to complex terrain or large structures and because the station is located on flat terrain. Sensors on the meteorological tower record wind speed, wind direction, air temperature, relative humidity, precipitation, dew point, and barometric pressure. Sensor readings of all parameters are recorded at one-second intervals, averaged, and stored as 15- and 60-minute averages in the data logger. Weekly data reports are available on the Navy's public Web site at:
http://www.efdsw.navfac.navy.mil/06/HPS_E/Landfill_Gas/index.htm#meteorological_data.

Table 9 presents daily meteorological data collected during September 2006. Daily meteorological data are averages of hourly data, except for daily precipitation, which is the sum of hourly precipitation data, and cumulative precipitation, which is the season-to-date total at the end of each day.

Table 10 summarizes monthly meteorological data for August 2005 through September 2006. Monthly meteorological data are averages of hourly data, except for monthly precipitation, which is the sum of daily precipitation data, and cumulative precipitation, which is the season to-date total at the end of each month.

Concentrations of methane may be affected by atmospheric variations, although other factors (e.g., groundwater elevation, changes in the operation of the extraction system) may overshadow any effects caused by atmospheric variations. Figures 6 and 7 show the daily barometric pressures and observed methane concentrations for each day that methane was monitored at GMPs at the fence line and on the UCSF compound. Similarly, figures 8 and 9 show the daily temperatures and the observed methane concentrations at the same GMPs. No correlations between methane readings and meteorological parameters are apparent at this time; however, longer-term (seasonal) effects on methane concentrations at GMPs appear to determine methane occurrence, as further discussed in Section 4.

4 EVALUATION OF RESULTS

The primary objective of monthly monitoring of landfill gases is to verify that the landfill gas control system is effective in preventing migration of landfill gas to the UCSF compound and adjacent non-Navy property. Monitoring locations include the GMPs, the crawlspace at Building 830, the on-site utilities, and the landfill gas control system. From May 2005 through February 7, 2006, when active extraction occurred for only 40 hours a week, monthly gas monitoring events were performed when the active gas extraction system was not operating. However, as long as active extraction is continuous, monthly gas monitoring events (beginning with the February 2006 event) will be performed while extraction proceeds.

During the September 2006 monitoring event, methane met regulatory performance standards established by 27 CCR at all monitoring locations. Aside from the control system and the wells located on the landfill cap, methane was detected at only one location: GMP24 at 1.7% by volume. This concentration was below the HPS action level for methane in GMPs (2.5% by volume) and the regulatory limit for methane in GMPs (5% by volume). Therefore, no extraction or followup monitoring was necessary.

During the September 2006 monitoring event, NMOCs were well below action levels at all monitoring locations. NMOCs were detected above background concentrations at four GMPs (GMP24 in the UCSF compound and GMP17, GMP19 and GMP32 on Crisp Avenue). The UCSF locations listed above have frequently had NMOC detections during monthly monitoring; however, NMOCs had not been detected in the above-listed Crisp Avenue locations for several months prior to the August 2006 event. This low-level presence of NMOCs on Crisp Avenue may be related to construction activities on Crisp Avenue and Parcel A, specifically a water line break that occurred at Crisp Avenue on July 27, 2006. All five of the Crisp Avenue GMPs in which low-level NMOCs have been detected in August and/or September 2006 are directly adjacent to the area flooded by this line break. Investigation into this potential relationship is ongoing. Nonetheless, as these low detections are significantly below the HPS NMOC action level for GMPs (500 ppmv), no action or followup monitoring was necessary.

Since regular monitoring was initiated in January 2004, methane concentrations at GMP24 have exceeded 2.5 percent by volume on six occasions (May, July, and September of 2004, August and October of 2005, and July of 2006), requiring activation of the active gas extraction system. All six occasions are in the drier half of the year (May through October), and this pattern probably reflects seasonal influences on gas migration. Methane concentrations at GMP23 have followed a similar seasonal pattern, with methane peaks roughly coinciding with troughs in groundwater elevations during the dry season (see Figure 13). One possible explanation for these elevated dry-season detections of methane is that lower groundwater levels, which result in a thicker and less constricted vadose zone, permit greater gas flow in the subsurface in this area. Monthly monitoring data is reviewed on an ongoing basis to identify possible seasonal and other influences on gas migration.

In contrast to the dry-season peaks at GMP23 and GMP24, methane detections to date at fence line GMPs GMP01A and GMP07A have been limited to the wet season (December through May; see Figure 14). No detections have occurred in the dry season. The detections at these two GMPs in January 2006 were much higher than those noted at any other time since January 2004. The methane exceedances of the 5% regulatory limit in January and early February 2006 followed a period of high precipitation in December and early January. This high precipitation was reflected in the rapid rise of groundwater elevations near GMP01A and GMP07A, as shown on Figure 14. These observations suggest that conditions specific to the wet season were causative factors.

One of the following mechanisms may account for the winter 2006 methane exceedances at the two fence line GMPs:

(1) Subsurface methane could be forced to move laterally or upward through displacement by water migrating in the subsurface. For example, seasonally rising groundwater combined with downward-infiltrating precipitation decreases the volume of the vadose zone, increasing soil-gas pressure and inducing pressure gradients that in turn could result in lateral gas migration in the subsurface. Note that wet surface soils tend to limit the upward escape of methane to the atmosphere that can more easily occur during the dry season in the uncapped part of the landfill between the cap and the trench (immediately northeast of the capped area).

(2) Conditions specific to the winter of 2006 may have restricted methane mitigation pathways. The groundwater extraction well and electrical vaults located along the southwest edge of the landfill, in which methane was often detected, had been excavated by a Navy contractor (as discussed in Section 2.4). These open excavations were flooded by heavy rains before being backfilled, potentially causing previously-existing subsurface methane pathways to be blocked by standing water.

Since continuous active extraction resumed at PV-02 on February 8, 2006, the presence of methane in the control system passive vents has fluctuated greatly, from low concentrations in February, March, and April 2006 (peak PV concentrations ranged from 0.0 to 8.1%) to much higher concentrations from May through September 2006 (peak PV concentrations ranged from 47.5% to 61.5%). Note, however, that methane remained at 0.0% in all of the fence line GMPs except GMP08A, indicating that the trench was acting to prevent methane migration beyond the trench. The recent increases in methane at the PVs could be accounted for by a variety of factors, including (1) higher temperatures, which could increase biological methane-generating activity; (2) lower groundwater levels, which could open up different seasonal migration pathways for methane; and (3) lower surface moisture or soil moisture, which could open up different seasonal migration pathways.

5 SUMMARY

Monthly landfill gas monitoring and water level measurements took place on September 25-28, 2006. Title 27 CCR limits concentrations of methane gas to 5 percent by volume at the site boundary and 1.25 percent by volume in on-site structures. During the September 2006 monitoring event, methane was detected in one GMP (GMP24 at 1.7% by volume). This concentration of methane was below the HPS action level for methane in GMPs (2.5% by volume) and the regulatory limit for methane in GMPs (5% by volume). Therefore, no action or followup monitoring was necessary. Note that three ambient air locations have been removed from the monthly monitoring program pursuant to the MCP and as discussed during the August BCT meeting.

The action levels for NMOCs (established based on an evaluation of previous risk assessments and Tetra Tech EM Inc. health and safety criteria [Tetra Tech EM Inc., 2002]) are 500 ppmv in GMPs, 5 ppmv within Building 830, 5 ppmv in on-site utilities, 5 ppmv in ambient air (recorded in the breathing zone), and 100 ppmv for 2 consecutive days from the outlet of the control system. During the September 2006 monitoring event, NMOCs were detected in four GMPs at concentrations up to 14.6 ppmv. NMOC concentrations were well below the corresponding action levels at all monitoring locations.

6 REFERENCES

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Tetra Tech EM Inc., 2004b. Draft Landfill Gas Time-Critical Removal Action Closeout Report, Parcel E, Industrial Landfill, Hunters Point Shipyard, San Francisco, California. March 19.

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TABLES

TABLE 1: PERSONNEL AND EQUIPMENT

Monthly Landfill Gas Monitoring Report for September 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

PERSONNEL

Name	Responsibility	Company
Brett Womack	Task Manager	Innovative Technical Solutions, Inc.
Scott Lovesy	Field Technician	Innovative Technical Solutions, Inc.

EQUIPMENT

Sampling Apparatus	Manufacturer/Model	Purpose
Landfill Gas Meter	CES-LANDTEC GEM-2000	Monitor methane, oxygen, carbon dioxide, and lower explosive limit
Photoionization Detector (10.6 electron-volt lamp)	Mini-RAE Plus Classic PGM-761S	Monitor non-methane organic compounds
Air Sampling Pump	Gilian GilAir-5	Purge GMPs
Pressure Gauge	Magnehelic	Measure pressure in GMPs

TABLE 2: LANDFILL GAS MONITORING LOCATIONS

Monthly Landfill Gas Monitoring Report for September 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

Monitoring Location [a]	Description
Fence Line GMPs	GMP01A, GMP02A, GMP03, GMP04A, GMP05B, GMP06B, GMP07A, GMP08A, GMP09, GMP10, GMP11A, GMP12, GMP20, and GMP21
UCSF Compound GMPs	GMP22 to GMP26
Crisp Avenue GMPs	GMP13 to GMP19 and GMP27 to GMP32
Occupied Structure	Building 830 Crawlspace
On-Site Utilities [b]	DP1 and DP2
Passive Vents	PV-01, PV-02[d], PV-03, PV-04, and PV-05
Extraction Wells [c]	EX-5, EX-6, EX-7, and EX-8
Groundwater Elevation Locations	GMP27, GMP28, GMP29, GMP30, GMP31, GMP32, IR01MW02B, IR01MW03A, IR01MW05A, IR01MW10A, IR01MW11A, IR01MW12A, IR01P04A, IR01P03AA, IR01P03AB, IR74MW01A[e], and IR76MW13A
Additional Monitoring Locations	IR01MW16A, IR01MW18A, IR01MW366A, IR01MWI-5

Notes:

[a] Three ambient air locations: Ambient Location A (fence line), Ambient Location B (basketball court), and the light pole, have been removed from the monitoring program pursuant to the MCP (see Section 2.4).

[b] EW108, EW122, EV122, EW134, EV134, EW138, EV138, EW142, EV142, EW146, EV146, EW150, EV150, EW154, EW158, and EV158 were excavated and removed between September 2005 and January 2006, and are no longer monitored.

[c] Monitoring at extraction wells is required only if the control system is actively extracting from these locations; however, they also may be included as part of response action monitoring.

[d] Active extraction point

[e] Well IR74MW01A was inaccessible due to construction activities, and therefore was not monitored on September 25, 2006.

DP discharge point
IR Installation Restoration
GMP gas monitoring probe
PV passive vent
MW monitoring well
UCSF University of California, San Francisco

TABLE 3: METHANE CONCENTRATIONS, SEPTEMBER 25-28, 2006

Monthly Landfill Gas Monitoring Report for September 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

Location [a]	Monitoring Location ID Number	Screened Interval (feet bgs)	Depth to Water (feet bgs)	Methane Concentration on September 25-28, 2006 (percent by volume)
Fence Line GMPs	GMP01A	6.0 to 13.5	NA	0.0
	GMP02A	6.0 to 13.5	NA	0.0
	GMP03	6.0 to 13.5	NA	0.0
	GMP04A	6.0 to 13.5	NA	0.0
	GMP05B	6.0 to 12.5	NA	0.0
	GMP06B	6.0 to 13.5	NA	0.0
	GMP07A	6.0 to 13.5	NA	0.0
	GMP08A	4.5 to 9.5	NA	0.0
	GMP09	6.0 to 9.5	NA	0.0
	GMP10	4.0 to 6.5	NA	0.0
	GMP11A	4.0 to 5.5	NA	0.0
	GMP12	5.0 to 13.0	NA	0.0
	GMP20	3.5 to 4.5	NA	0.0
	GMP21	3.5 to 4.5	NA	0.0
UCSF Compound GMPs	GMP22	6.0 to 13.5	NA	0.0
	GMP23	6.0 to 13.5	NA	0.0
	GMP24	6.0 to 13.0	NA	1.7
	GMP25	6.5 to 11.5	NA	0.0
	GMP26	6.5 to 11.5	NA	0.0
Crisp Avenue GMPs	GMP13	6.0 to 12.0	NA	0.0
	GMP14	6.0 to 10.0	NA	0.0
	GMP15	6.0 to 12.0	NA	0.0
	GMP16	5.0 to 10.0	NA	0.0
	GMP17	6.0 to 10.0	NA	0.0
	GMP18	6.0 to 12.0	NA	0.0
	GMP19	4.5 to 5.5	NA	0.0
	GMP27	4.7 to 22.2	12.19	0.0
	GMP28	6.2 to 21.2	16.10	0.0
	GMP29	6.2 to 18.7	14.23	0.0
	GMP30	4.5 to 17.0	12.70	0.0
	GMP31	6.0 to 16.0	12.40	0.0
	GMP32	4.75 to 14.75	11.46	0.0

TABLE 3: METHANE CONCENTRATIONS, SEPTEMBER 25-28, 2006 (continued)

Monthly Landfill Gas Monitoring Report for September 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

Location [a]	Monitoring Location ID Number	Screened Interval (feet bgs)	Depth to Water (feet bgs)	Methane Concentration on September 25-28, 2006 (percent by volume)
Occupied Structure	Building 830 Crawlspace	NA	NA	0.0
On-Site Utilities [b]	DP1	NA	NA	0.0
	DP2	NA	NA	0.0
Passive Vents [c]	PV-01 Influent	NA	NA	47.5
	PV-01 Carbon 1	NA	NA	26.0
	PV-01 Hydrosil	NA	NA	5.0
	PV-02 Influent	NA	NA	9.2
	PV-02 Carbon 1 [d]	NA	NA	3.1
	PV-02 Hydrosil [d]	NA	NA	3.2
	PV-03 Influent	NA	NA	0.0
	PV-03 Carbon 1	NA	NA	0.0
	PV-03 Hydrosil	NA	NA	0.0
	PV-04 Influent	NA	NA	60.1
	PV-04 Carbon 1	NA	NA	57.9
	PV-04 Hydrosil	NA	NA	60.7
	PV-05 Influent	NA	NA	27.9
	PV-05 Carbon 1	NA	NA	25.5
	PV-05 Hydrosil	NA	NA	15.0

Notes:

[a] Three ambient air locations: Ambient Location A (fence line), Ambient Location B (basketball court), and the light pole, have been removed from the monitoring program pursuant to the MCP (see Section 2.4).

[b] EW108, EW122, EV122, EW134, EV134, EW138, EV138, EW142, EV142, EW146, EV146, EW150, EV150, EW154, EW158, and EV158 were excavated and removed between September 2005 and January 2006, and are no longer monitored.

[c] The regulatory limit of 5% methane does not apply to passive vents, which are part of the remedial system designed to collect and control migration of landfill gas.

[d] The PV-02 Carbon 1 and Hydrosil drums are located on the active extraction trailer.

bgs below ground surface
DP discharge point
GMP gas monitoring probe
NA not applicable
PV passive vent
UCSF University of California, San Francisco

Data from additional (landfill cap) monitoring locations are shown in Appendix B

TABLE 4: NMOC CONCENTRATIONS, SEPTEMBER 25-28, 2006

Monthly Landfill Gas Monitoring Report for September 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

Location [a]	Monitoring Location ID Number	Screened Interval (feet bgs)	Depth to Water (feet bgs)	NMOC Concentration on September 25-28, 2006 (parts per million)
Fence Line GMPs	GMP01A	6.0 to 13.5	NA	0.1
	GMP02A	6.0 to 13.5	NA	0.1
	GMP03	6.0 to 13.5	NA	0.1
	GMP04A	6.0 to 13.5	NA	0.1
	GMP05B	6.0 to 12.5	NA	0.1
	GMP06B	6.0 to 13.5	NA	0.1
	GMP07A	6.0 to 13.5	NA	0.1
	GMP08A	4.5 to 9.5	NA	0.1
	GMP09	6.0 to 9.5	NA	0.1
	GMP10	4.0 to 6.5	NA	0.1
	GMP11A	4.0 to 5.5	NA	0.1
	GMP12	5.0 to 13.0	NA	0.1
	GMP20	3.5 to 4.5	NA	0.1
	GMP21	3.5 to 4.5	NA	0.1
UCSF Compound GMPs	GMP22	6.0 to 13.5	NA	0.1
	GMP23	6.0 to 13.5	NA	0.1
	GMP24	6.0 to 13.0	NA	1.2
	GMP25	6.5 to 11.5	NA	0.1
	GMP26	6.5 to 11.5	NA	0.1
Crisp Avenue GMPs	GMP13	6.0 to 12.0	NA	0.1
	GMP14	6.0 to 10.0	NA	0.1
	GMP15	6.0 to 12.0	NA	0.1
	GMP16	5.0 to 10.0	NA	0.1
	GMP17	6.0 to 10.0	NA	1.3
	GMP18	6.0 to 12.0	NA	0.1
	GMP19	4.5 to 5.5	NA	14.6
	GMP27	4.7 to 22.2	12.19	0.1
	GMP28	6.2 to 21.2	16.10	0.1
	GMP29	6.2 to 18.7	14.23	0.1
	GMP30	4.5 to 17.0	12.70	0.1
	GMP31	6.0 to 16.0	12.40	0.1
	GMP32	4.75 to 14.75	11.46	6.8

TABLE 4: NMOC CONCENTRATIONS, SEPTEMBER 25-28, 2006 (continued)

Monthly Landfill Gas Monitoring Report for September 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

Location [a]	Monitoring Location ID Number	Screened Interval (feet bgs)	Depth to Water (feet bgs)	NMOC Concentration on September 25-28, 2006 (parts per million)
Occupied Structure	Building 830 Crawlspace	NA	NA	0.1
On-Site Utilities [b]	DP1	NA	NA	0.1
	DP2	NA	NA	0.1
Passive Vents [c]	PV-01 Influent	NA	NA	0.1
	PV-01 Carbon 1	NA	NA	0.1
	PV-01 Hydrosil	NA	NA	0.1
	PV-02 Influent	NA	NA	1.7
	PV-02 Carbon 1 [d]	NA	NA	0.1
	PV-02 Hydrosil [d]	NA	NA	0.1
	PV-03 Influent	NA	NA	0.7
	PV-03 Carbon 1	NA	NA	0.1
	PV-03 Hydrosil	NA	NA	0.1
	PV-04 Influent	NA	NA	0.1
	PV-04 Carbon 1	NA	NA	0.1
	PV-04 Hydrosil	NA	NA	0.1
	PV-05 Influent	NA	NA	2.3
	PV-05 Carbon 1	NA	NA	0.1
	PV-05 Hydrosil	NA	NA	0.1

Notes:

[a] Three ambient air locations: Ambient Location A (fence line), Ambient Location B (basketball court), and the light pole, have been removed from the monitoring program pursuant to the MCP (see Section 2.4).

[b] EW108, EW122, EV122, EW134, EV134, EW138, EV138, EW142, EV142, EW146, EV146, EW150, EV150, EW154, EW158, and EV158 were excavated and removed between September 2005 and January 2006, and are no longer monitored.

[c] The regulatory limit of 5% methane does not apply to passive vents, which are part of the remedial system designed to collect and control migration of landfill gas.

[d] The PV-02 Carbon 1 and Hydrosil drums are located on the active extraction trailer.

bgs below ground surface
DP discharge point
GMP gas monitoring probe
NA not applicable
ppm parts per million
PV passive vent
UCSF University of California, San Francisco

Data from additional (landfill cap) monitoring locations are shown in Appendix B

TABLE 5: OXYGEN CONCENTRATIONS, SEPTEMBER 25-28, 2006

Monthly Landfill Gas Monitoring Report for September 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

Location [a]	Monitoring Location ID Number	Screened Interval (feet bgs)	Depth to Water (feet bgs)	Oxygen Concentration on September 25-28, 2006 (percent by volume)
Fence Line GMPs	GMP01A	6.0 to 13.5	NA	13.1
	GMP02A	6.0 to 13.5	NA	3.7
	GMP03	6.0 to 13.5	NA	8.4
	GMP04A	6.0 to 13.5	NA	17.1
	GMP05B	6.0 to 12.5	NA	15.1
	GMP06B	6.0 to 13.5	NA	17.6
	GMP07A	6.0 to 13.5	NA	11.6
	GMP08A	4.5 to 9.5	NA	0.5
	GMP09	6.0 to 9.5	NA	17.8
	GMP10	4.0 to 6.5	NA	19.8
	GMP11A	4.0 to 5.5	NA	14.4
	GMP12	5.0 to 13.0	NA	14.2
	GMP20	3.5 to 4.5	NA	17.0
	GMP21	3.5 to 4.5	NA	18.8
UCSF Compound GMPs	GMP22	6.0 to 13.5	NA	4.9
	GMP23	6.0 to 13.5	NA	3.3
	GMP24	6.0 to 13.0	NA	0.3
	GMP25	6.5 to 11.5	NA	0.9
	GMP26	6.5 to 11.5	NA	13.8
Crisp Avenue GMPs	GMP13	6.0 to 12.0	NA	21.0
	GMP14	6.0 to 10.0	NA	19.6
	GMP15	6.0 to 12.0	NA	20.2
	GMP16	5.0 to 10.0	NA	21.3
	GMP17	6.0 to 10.0	NA	20.8
	GMP18	6.0 to 12.0	NA	20.6
	GMP19	4.5 to 5.5	NA	20.8
	GMP27	4.7 to 22.2	12.19	18.2
	GMP28	6.2 to 21.2	16.10	15.4
	GMP29	6.2 to 18.7	14.23	15.5
	GMP30	4.5 to 17.0	12.70	20.3
	GMP31	6.0 to 16.0	12.40	21.1
	GMP32	4.75 to 14.75	11.46	20.9

TABLE 5: OXYGEN CONCENTRATIONS, SEPTEMBER 25-28, 2006 (continued)

Monthly Landfill Gas Monitoring Report for September 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

Location [a]	Monitoring Location ID Number	Screened Interval (feet bgs)	Depth to Water (feet bgs)	Oxygen Concentration on September 25-28, 2006 (percent by volume)
Occupied Structure	Building 830 Crawlspace	NA	NA	21.2
On-Site Utilities [b]	DP1	NA	NA	21.3
	DP2	NA	NA	21.4
Passive Vents [c]	PV-01 Influent	NA	NA	2.6
	PV-01 Carbon 1	NA	NA	2.7
	PV-01 Hydrosil	NA	NA	10.7
	PV-02 Influent	NA	NA	13.4
	PV-02 Carbon 1 [d]	NA	NA	17.9
	PV-02 Hydrosil [d]	NA	NA	17.9
	PV-03 Influent	NA	NA	19.4
	PV-03 Carbon 1	NA	NA	18.0
	PV-03 Hydrosil	NA	NA	20.0
	PV-04 Influent	NA	NA	0.3
	PV-04 Carbon 1	NA	NA	0.4
	PV-04 Hydrosil	NA	NA	0.6
	PV-05 Influent	NA	NA	7.8
	PV-05 Carbon 1	NA	NA	8.1
	PV-05 Hydrosil	NA	NA	14.1

Notes:

[a] Three ambient air locations: Ambient Location A (fence line), Ambient Location B (basketball court), and the light pole, have been removed from the monitoring program pursuant to the MCP (see Section 2.4).

[b] EW108, EW122, EV122, EW134, EV134, EW138, EV138, EW142, EV142, EW146, EV146, EW150, EV150, EW154, EW158, and EV158 were excavated and removed between September 2005 and January 2006, and are no longer monitored.

[c] The regulatory limit of 5% methane does not apply to passive vents, which are part of the remedial system designed to collect and control migration of landfill gas.

[d] The PV-02 Carbon 1 and Hydrosil drums are located on the active extraction trailer.

bgs below ground surface
DP discharge point
GMP gas monitoring probe
NA not applicable
PV passive vent
UCSF University of California, San Francisco

Data from additional (landfill cap) monitoring locations are shown in Appendix B

TABLE 6: CARBON DIOXIDE CONCENTRATIONS, SEPTEMBER 25-28, 2006

Monthly Landfill Gas Monitoring Report for September 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

Location [a]	Monitoring Location ID Number	Screened Interval (feet bgs)	Depth to Water (feet bgs)	Carbon Dioxide Concentration on September 25-28, 2006 (percent by volume)
Fence Line GMPs	GMP01A	6.0 to 13.5	NA	5.8
	GMP02A	6.0 to 13.5	NA	12.0
	GMP03	6.0 to 13.5	NA	9.7
	GMP04A	6.0 to 13.5	NA	3.1
	GMP05B	6.0 to 12.5	NA	3.9
	GMP06B	6.0 to 13.5	NA	3.2
	GMP07A	6.0 to 13.5	NA	4.9
	GMP08A	4.5 to 9.5	NA	4.3
	GMP09	6.0 to 9.5	NA	2.3
	GMP10	4.0 to 6.5	NA	1.0
	GMP11A	4.0 to 5.5	NA	5.5
	GMP12	5.0 to 13.0	NA	6.0
	GMP20	3.5 to 4.5	NA	4.4
	GMP21	3.5 to 4.5	NA	2.3
UCSF Compound GMPs	GMP22	6.0 to 13.5	NA	11.5
	GMP23	6.0 to 13.5	NA	14.1
	GMP24	6.0 to 13.0	NA	13.8
	GMP25	6.5 to 11.5	NA	11.4
	GMP26	6.5 to 11.5	NA	2.6
Crisp Avenue GMPs	GMP13	6.0 to 12.0	NA	0.2
	GMP14	6.0 to 10.0	NA	0.7
	GMP15	6.0 to 12.0	NA	0.7
	GMP16	5.0 to 10.0	NA	0.0
	GMP17	6.0 to 10.0	NA	0.2
	GMP18	6.0 to 12.0	NA	0.4
	GMP19	4.5 to 5.5	NA	0.2
	GMP27	4.7 to 22.2	12.19	1.1
	GMP28	6.2 to 21.2	16.10	2.2
	GMP29	6.2 to 18.7	14.23	1.4
	GMP30	4.5 to 17.0	12.70	0.5
	GMP31	6.0 to 16.0	12.40	0.0
	GMP32	4.75 to 14.75	11.46	0.2

TABLE 6: CARBON DIOXIDE CONCENTRATIONS, SEPTEMBER 25-28, 2006 (continued)

Monthly Landfill Gas Monitoring Report for September 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

Location [a]	Monitoring Location ID Number	Screened Interval (feet bgs)	Depth to Water (feet bgs)	Carbon Dioxide Concentration on September 25-28, 2006 (percent by volume)
Occupied Structure	Building 830 Crawlspace	NA	NA	0.0
On-Site Utilities [b]	DP1	NA	NA	0.0
	DP2	NA	NA	0.0
Passive Vents [c]	PV-01 Influent	NA	NA	25.4
	PV-01 Carbon 1	NA	NA	20.0
	PV-01 Hydrosil	NA	NA	12.1
	PV-02 Influent	NA	NA	7.8
	PV-02 Carbon 1 [d]	NA	NA	2.9
	PV-02 Hydrosil [d]	NA	NA	3.0
	PV-03 Influent	NA	NA	1.0
	PV-03 Carbon 1	NA	NA	3.7
	PV-03 Hydrosil	NA	NA	0.9
	PV-04 Influent	NA	NA	34.7
	PV-04 Carbon 1	NA	NA	33.7
	PV-04 Hydrosil	NA	NA	27.8
	PV-05 Influent	NA	NA	22.2
	PV-05 Carbon 1	NA	NA	25.2
	PV-05 Hydrosil	NA	NA	8.6

Notes:

[a] Three ambient air locations: Ambient Location A (fence line), Ambient Location B (basketball court), and the light pole, have been removed from the monitoring program pursuant to the MCP (see Section 2.4).

[b] EW108, EW122, EV122, EW134, EV134, EW138, EV138, EW142, EV142, EW146, EV146, EW150, EV150, EW154, EW158, and EV158 were excavated and removed between September 2005 and January 2006, and are no longer monitored.

[c] The regulatory limit of 5% methane does not apply to passive vents, which are part of the remedial system designed to collect and control migration of landfill gas.

[d] The PV-02 Carbon 1 and Hydrosil drums are located on the active extraction trailer.

bgs below ground surface
DP discharge point
GMP gas monitoring probe
NA not applicable
PV passive vent
UCSF University of California, San Francisco

Data from additional (landfill cap) monitoring locations are shown in Appendix B

TABLE 7: PROBE PRESSURES AT GMPS, SEPTEMBER 25-28, 2006

Monthly Landfill Gas Monitoring Report for September 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

Location	Monitoring Location Identification Number	Screened Interval (feet bgs)	Probe Pressure (inches of water)
Fence Line GMPs	GMP01A	6.0 to 13.5	0.0
	GMP02A	6.0 to 13.5	0.0
	GMP03	6.0 to 13.5	0.0
	GMP04A	6.0 to 13.5	0.0
	GMP05B	6.0 to 12.5	0.0
	GMP06B	6.0 to 13.5	0.0
	GMP07A	6.0 to 13.5	0.0
	GMP08A	4.5 to 9.5	0.0
	GMP09	6.0 to 9.5	0.0
	GMP10	4.0 to 6.5	0.0
	GMP11A	4.0 to 5.5	0.0
	GMP12	5.0 to 13.0	0.0
	GMP20	3.5 to 4.5	0.0
	GMP21	3.5 to 4.5	0.0
UCSF Compound GMPs	GMP22	6.0 to 13.5	0.0
	GMP23	6.0 to 13.5	0.0
	GMP24	6.0 to 13.0	0.0
	GMP25	6.5 to 11.5	0.0
	GMP26	6.5 to 11.5	0.0
Crisp Avenue GMPs	GMP13	6.0 to 12.0	0.0
	GMP14	6.0 to 10.0	0.0
	GMP15	6.0 to 12.0	0.0
	GMP16	5.0 to 10.0	0.0
	GMP17	6.0 to 10.0	0.0
	GMP18	6.0 to 12.0	0.0
	GMP19	4.5 to 5.5	0.0
	GMP27	4.7 to 22.2	0.0
	GMP28	6.2 to 21.2	0.0
	GMP29	6.2 to 18.7	0.0
	GMP30	4.5 to 17.0	0.0
	GMP31	6.0 to 16.0	0.0
	GMP32	4.75 to 14.75	0.0

Notes:
bgs below ground surface
GMP gas monitoring probe
UCSF University of California, San Francisco

TABLE 8: GROUNDWATER ELEVATIONS, SEPTEMBER 25, 2006

Monthly Landfill Gas Monitoring Report for September 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

Monitoring Location ID Number	Top of Casing Elevation (feet above msl)	Ground Surface Elevation (feet above msl)	Depth to Water (feet btoc)	Depth to Water (feet bgs)	Groundwater Elevation (feet above msl)
GMP27	21.66	22.15	11.70	12.19	9.96
GMP28	20.17	20.71	15.56	16.10	4.61
GMP29	18.48	18.92	13.79	14.23	4.69
GMP30	16.62	17.06	12.26	12.70	4.36
GMP31	15.34	15.78	11.96	12.40	3.38
GMP32	14.02	14.59	10.89	11.46	3.13
IR01MW02B	20.61	19.16	15.02	13.57	5.59
IR01MW03A	19.89	19.46	14.31	13.88	5.58
IR01MW05A	22.56	20.44	17.43	15.31	5.13
IR01MW10A	13.75	13.93	9.10	9.28	4.65
IR01MW11A	17.96	15.90	13.24	11.18	4.72
IR01MW12A	18.25	16.28	13.35	11.38	4.90
IR01P03AA	21.86	19.70	16.64	14.48	5.22
IR01P03AB	19.87	20.47	13.98	14.58	5.89
IR01P04A	21.61	19.29	16.45	14.13	5.16
IR74MW01A*	13.16	13.88	NM	NM	NM
IR76MW13A	19.69	20.04	14.10	14.45	5.59

Notes:

* Well IR74MW01A was trench-plated, and therefore was not monitored on September 25, 2006.

bgs below ground surface
btoc below top of casing
GMP gas monitoring probe
IR Installation Restoration
msl mean sea level
MW monitoring well
NM not monitored

TABLE 9: DAILY METEOROLOGICAL DATA, SEPTEMBER 2006

Monthly Landfill Gas Monitoring Report for September 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

Date	Wind Speed (mph)	Wind Direction (degrees)	Standard Deviation of Wind Direction (degrees)	Air Temperature (°F)	Relative Humidity (%)	Daily Precipitation (inches)	Dew Point (°F)	Barometric Pressure (in. mercury)	Cumulative Precipitation (inches)*
9/1/2006	10.66	289.2	11.29	58.01	86.34	0.00	50.27	29.86	7.83
9/2/2006	10.82	272.0	12.24	56.71	84.05	0.00	48.72	29.87	7.83
9/3/2006	10.79	267.9	13.95	56.22	83.14	0.00	48.10	29.87	7.83
9/4/2006	10.39	273.0	12.77	57.21	81.41	0.00	48.51	29.92	7.83
9/5/2006	8.66	265.5	21.20	57.65	85.12	0.00	49.52	29.99	7.83
9/6/2006	10.70	274.3	18.13	56.00	89.83	0.00	49.21	29.96	7.83
9/7/2006	10.54	286.6	11.48	56.92	87.76	0.00	49.59	29.80	7.83
9/8/2006	11.15	237.3	14.49	56.46	84.52	0.00	48.62	29.83	7.83
9/9/2006	9.19	249.5	16.00	56.65	87.95	0.00	49.56	29.93	7.83
9/10/2006	7.96	254.2	21.46	57.27	86.68	0.00	49.68	29.95	7.83
9/11/2006	6.94	218.2	28.14	61.78	79.03	0.00	51.14	29.95	7.83
9/12/2006	8.47	244.8	15.20	63.16	73.57	0.00	51.03	29.91	7.83
9/13/2006	12.95	285.6	8.65	57.12	89.30	0.00	50.16	29.81	7.83
9/14/2006	11.36	252.1	16.30	57.51	76.00	0.00	47.52	29.69	7.83
9/15/2006	14.63	280.2	9.35	57.72	74.51	0.00	47.36	29.84	7.83
9/16/2006	7.85	243.5	20.15	59.52	68.63	0.00	46.58	30.02	7.83
9/17/2006	6.54	259.6	22.04	62.79	62.51	0.00	47.28	29.98	7.83
9/18/2006	9.58	271.2	15.29	61.81	73.63	0.00	50.36	29.90	7.83
9/19/2006	9.28	271.9	13.34	59.16	74.64	0.00	48.59	29.89	7.83
9/20/2006	7.80	268.6	18.89	62.39	63.61	0.00	46.80	29.95	7.83

TABLE 9: DAILY METEOROLOGICAL DATA, SEPTEMBER 2006 (continued)

Monthly Landfill Gas Monitoring Report for September 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

Date	Wind Speed (mph)	Wind Direction (degrees)	Standard Deviation of Wind Direction (degrees)	Air Temperature (°F)	Relative Humidity (%)	Daily Precipitation (inches)	Dew Point (°F)	Barometric Pressure (in. mercury)	Cumulative Precipitation (inches)*
9/21/2006	9.54	293.8	11.21	62.08	69.93	0.00	49.90	29.84	7.83
9/22/2006	8.85	261.7	14.17	66.15	45.07	0.00	42.96	29.73	7.83
9/23/2006	7.74	274.2	20.38	60.07	75.23	0.00	49.34	29.88	7.83
9/24/2006	7.62	252.8	19.51	60.25	78.89	0.00	50.27	29.96	7.83
9/25/2006	6.77	234.7	17.36	63.50	66.73	0.00	49.16	29.93	7.83
9/26/2006	11.27	276.7	13.50	58.07	85.95	0.00	50.22	30.00	7.83
9/27/2006	9.65	277.9	10.97	58.43	84.21	0.00	50.26	30.06	7.83
9/28/2006	9.68	281.3	10.70	54.80	89.76	0.00	48.26	30.04	7.83
9/29/2006	9.23	267.37	13.90	55.15	86.07	0.00	47.79	30.00	7.83
9/30/2006	7.78	259.11	15.14	57.82	73.05	0.00	47.12	29.97	7.83

Notes:

Daily meteorological data are averages of hourly data except for daily precipitation, which is the sum of hourly precipitation data, and cumulative precipitation, which is the season-to-date total at the end of each day.

* Cumulative Precipitation is based on a January–December season.

°F	degrees Fahrenheit
%	percent
in.	inches
mph	miles per hour
NA	not available

TABLE 10: MONTHLY METEOROLOGICAL SUMMARY

Monthly Landfill Gas Monitoring Report for September 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

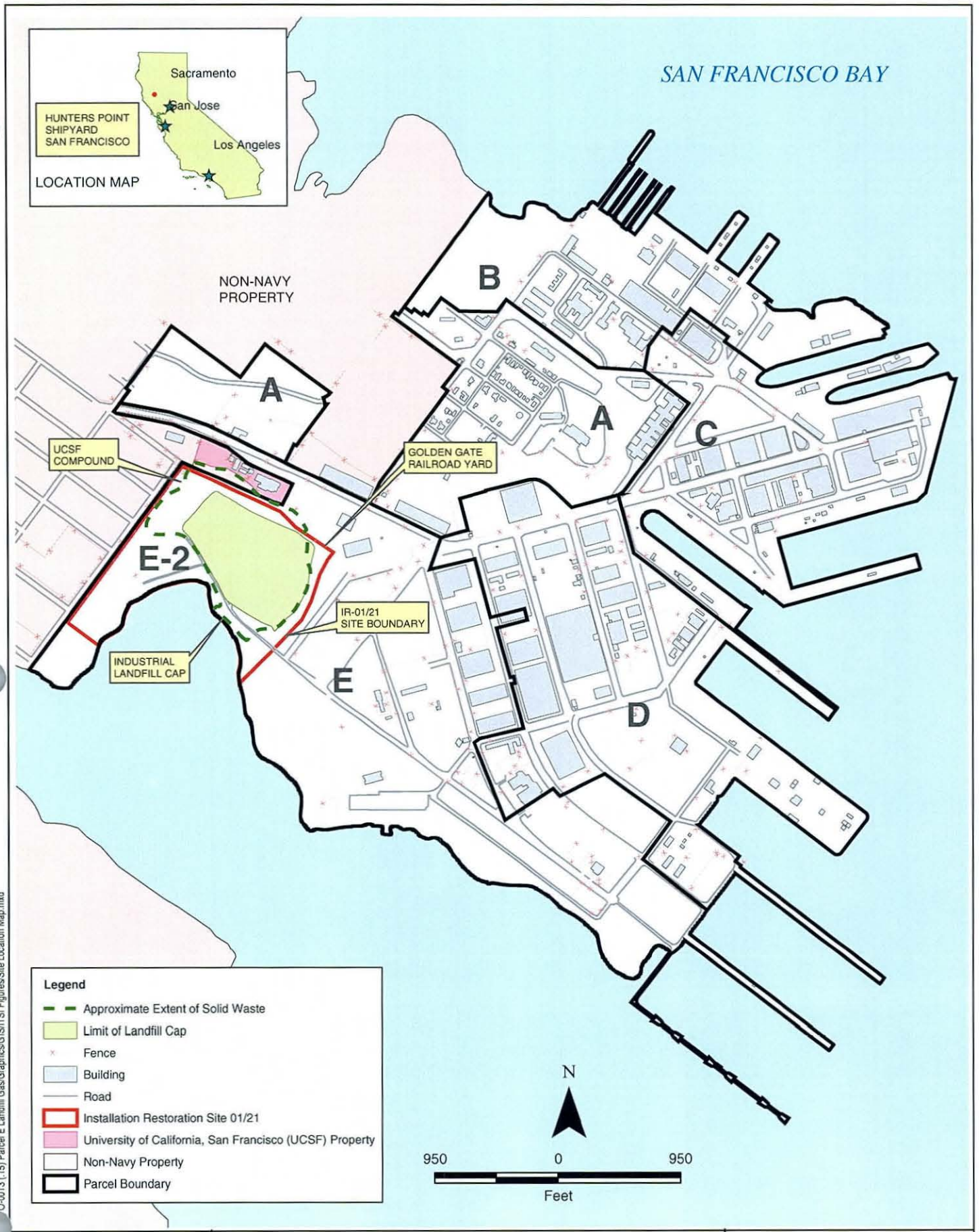
Date	Wind Speed (mph)	Wind Direction (degrees)	Standard Deviation of Wind Direction (degrees)	Air Temperature (°F)	Relative Humidity (%)	Monthly Precipitation (inches)	Dew Point (°F)	Barometric Pressure (in. mercury)	Cumulative Precipitation (inches)*
August 2005	10.51	276.86	13.46	58.93	82.12	0.00	49.94	29.90	8.54
September 2005	9.44	264.84	17.11	58.66	79.43	0.00	49.08	29.95	8.54
October 2005	7.83	250.26	19.11	58.38	76.84	0.09	47.99	29.98	8.63
November 2005	5.56	212.30	30.22	56.84	72.96	0.85	45.72	30.08	9.48
December 2005	6.54	185.35	26.62	53.45	80.60	4.84	44.86	30.08	14.32
January 2006	5.62	201.70	29.65	51.80	79.07	1.32	43.06	30.14	1.32
February 2006	6.07	204.89	28.75	52.46	74.19	1.18	42.20	30.07	2.50
March 2006	8.84	212.85	19.37	50.62	74.59	3.12	41.02	29.97	5.62
April 2006	8.35	225.90	19.56	54.56	77.77	1.96	45.27	29.95	7.58
May 2006	10.15	255.70	17.63	57.35	75.51	0.25	46.98	29.96	7.83
June 2006	10.79	269.69	15.15	59.96	78.71	0.00	50.00	29.95	7.83
July 2006	11.07	275.83	14.49	61.64	78.19	0.00	51.25	29.91	7.83
August 2006	10.04	266.52	15.35	59.71	80.38	0.00	50.36	29.91	7.83
September 2006	9.48	264.82	15.57	58.95	78.24	0.00	48.80	29.91	7.83

Notes:
Monthly meteorological data are averages of hourly measurements except for monthly precipitation, which is the sum of hourly precipitation data, and cumulative precipitation, which is the season-to-date total on the last day of each month.

* Cumulative Precipitation is calculated based on a calendar-year (i.e., January–December) season.

°F degrees Fahrenheit
% percent
in. inches
mph miles per hour

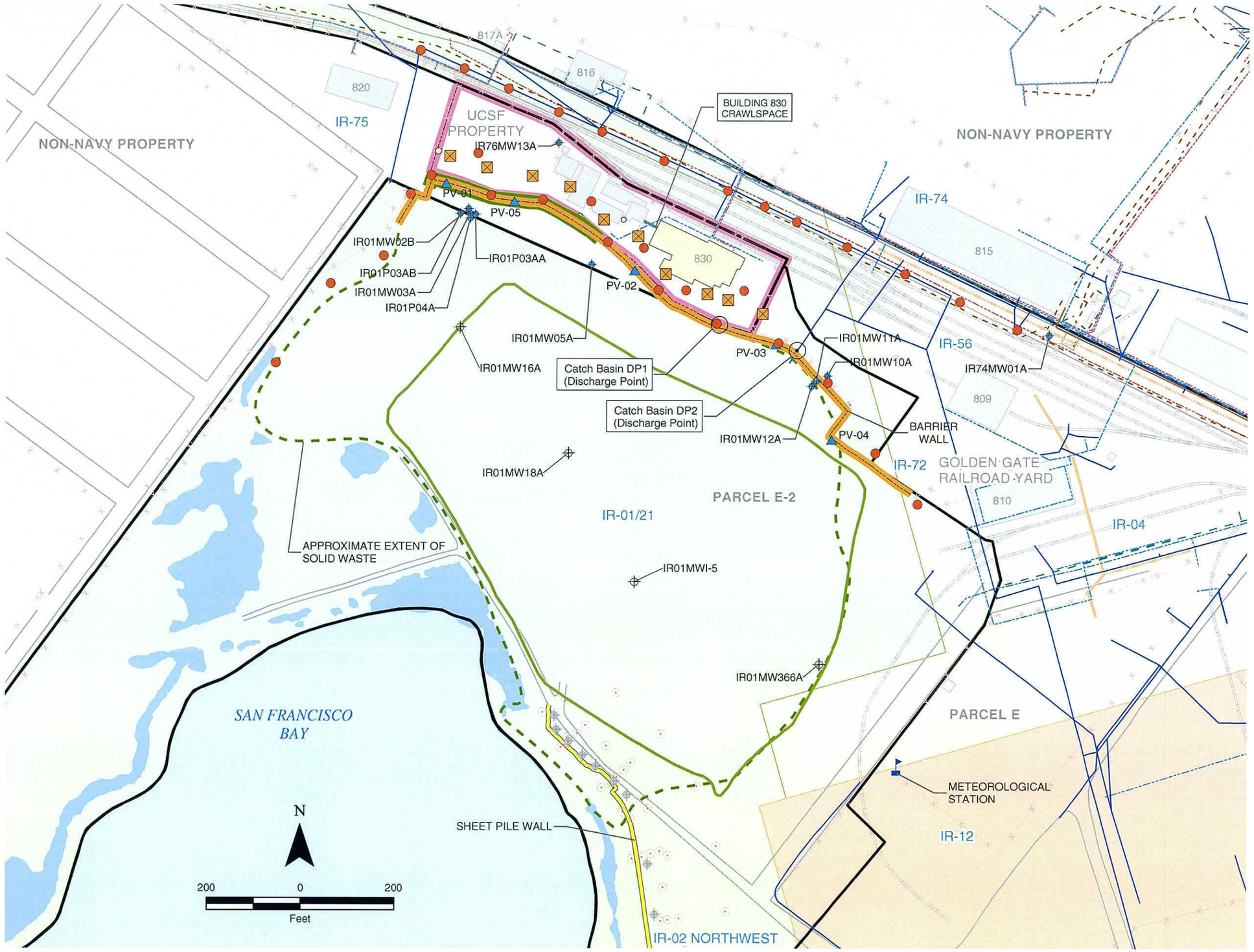
FIGURES



2002/02-125 Navy O-0013 (.15) Parcel E Landfill Gas/Graphics/GIS/ITSI Figures/Site Location Map.mxd

Monthly Landfill Gas Monitoring Report
Hunters Point Shipyard
San Francisco, California

FIGURE 1
Site Location Map



Legend

- Gas Monitoring Probe
- Extraction Well
- Monitoring Well with Water Level Measurement
- Other Monitoring Well
- Passive Vent
- Catch Basin Discharge Point
- Groundwater Extraction System Well/Vault
- Former Location of Groundwater Extraction System Well/Vault
- Grouted Section of HDPE Barrier Wall
- Groundwater Extraction System Piezometer
- HDPE Barrier Wall and Extraction Trench
- Meteorological Station
- Surface/Building Air Monitoring Location
- Limit of Landfill Cap
- Approximate Extent of Solid Waste
- Sheet Pile Wall
- Storm Water Line
- Water Line
- Saltwater Line
- Steam Line
- Sanitary Sewer Line
- Electric Line
- Gas Line
- Fence Line
- Parcel Boundary
- Wetland (Surveyed in October 2001)
- Building
- Road
- Rail Line
- UCSF Property
- Non-Navy Property
- Industrial
- Open Space
- Research and Development
- Residential

Notes:

EW	Groundwater extraction well
EX	Gas extraction well
GMP	Gas monitoring probe
HDPE	High-density polyethylene
IR	Installation Restoration
PV	Passive Vent
UCSF	University of California, San Francisco

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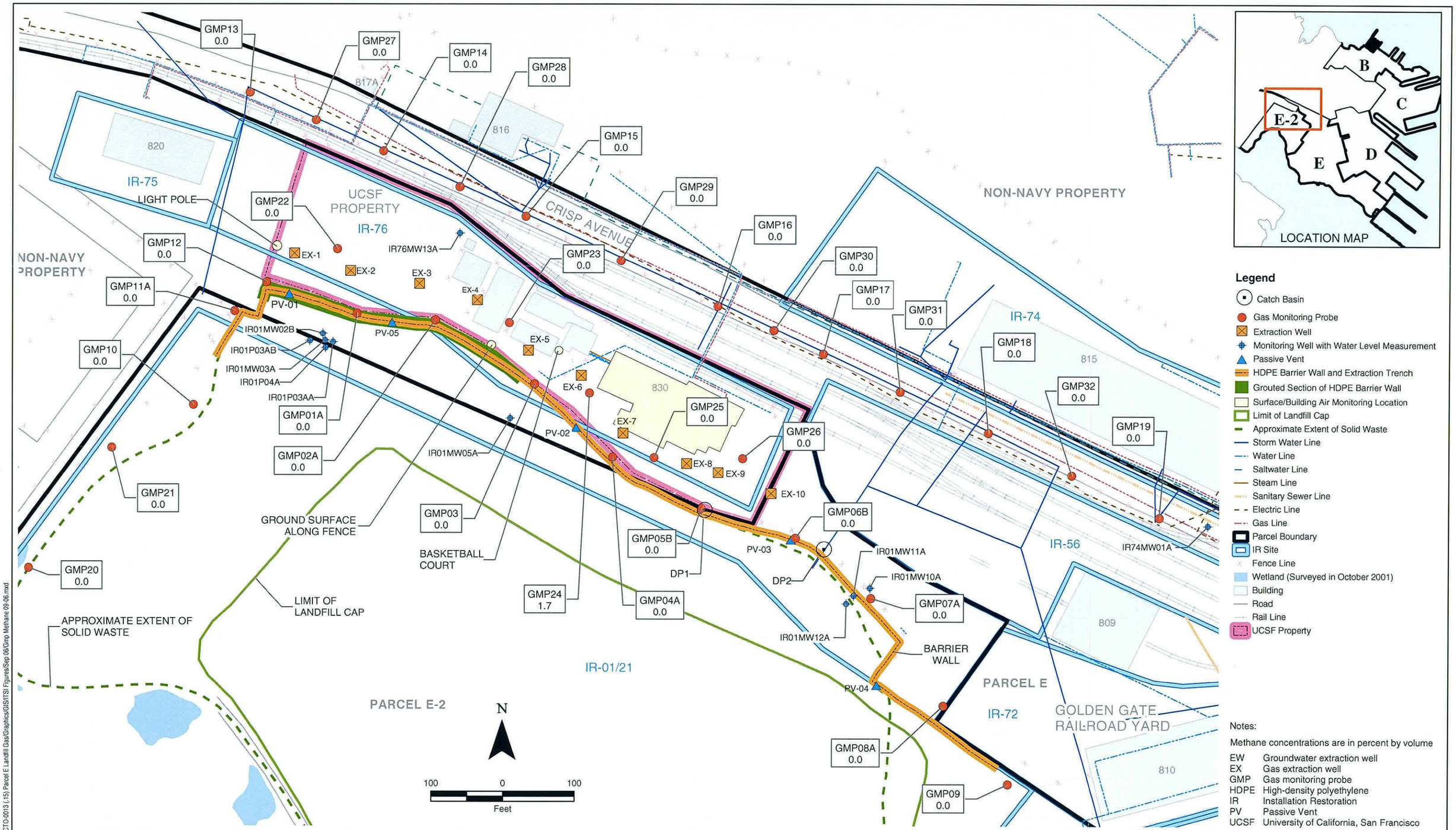
Monthly Landfill Gas Monitoring Report
Hunters Point Shipyard
San Francisco, California

FIGURE 2
Site Map and
Landfill Gas Monitoring Locations



Notes:

Methane concentrations are in percent by volume

EW	Groundwater extraction well
EX	Gas extraction well
GMP	Gas monitoring probe
HDPE	High-density polyethylene
IR	Installation Restoration
PV	Passive Vent
UCSF	University of California, San Francisco

2002/02-125 Navy HPS/CTO-0013 (15) Parcel E Landfill Gas/Graphics/GIS/ITSI Figures/Sep 06/Gmp Methane 09-06.mxd

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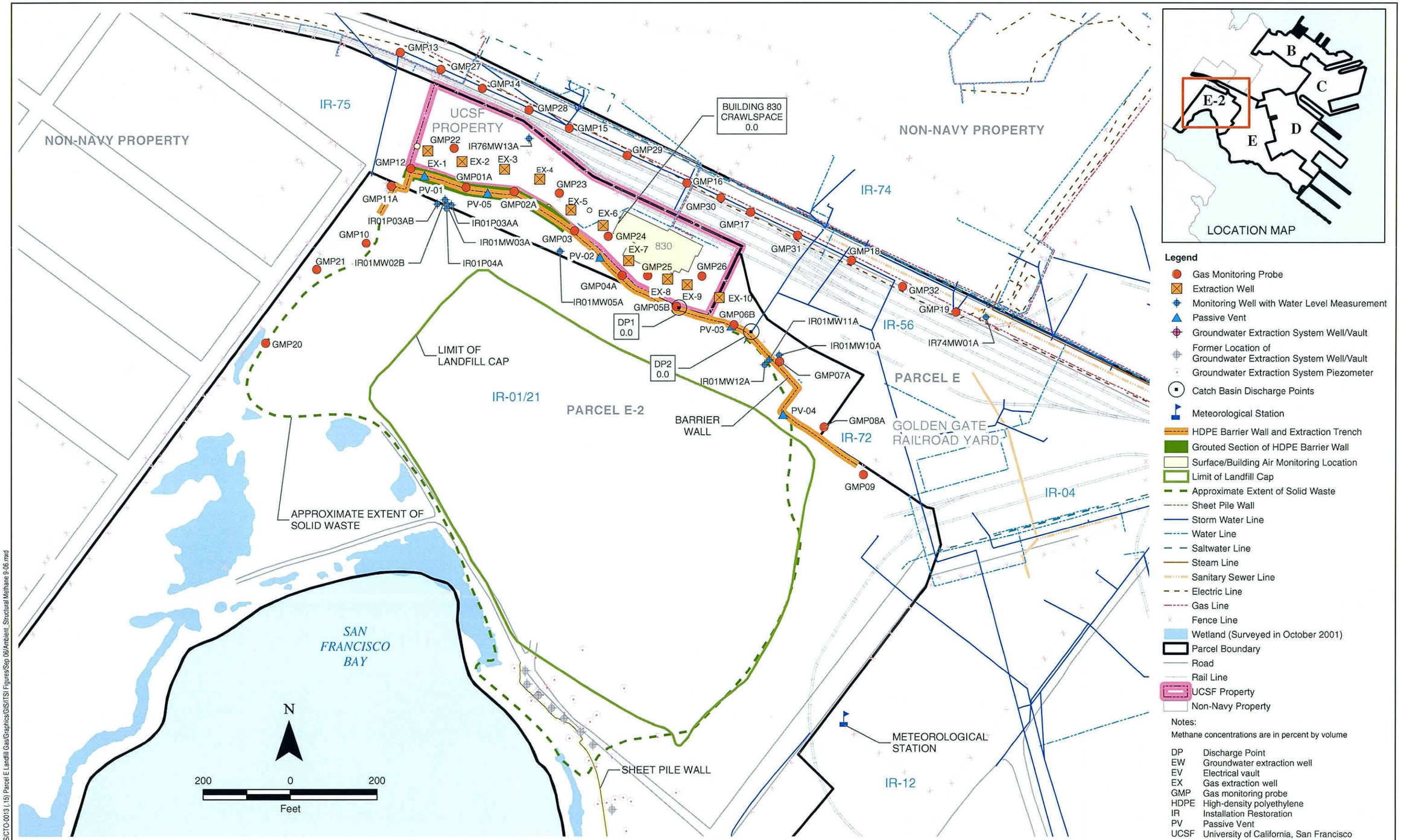
Hunters Point Shipyard
San Francisco, California

FIGURE 3
Methane Concentrations at GMPs
September 25-28, 2006



Legend

- Gas Monitoring Probe
- Extraction Well
- Monitoring Well with Water Level Measurement
- Passive Vent
- Groundwater Extraction System Well/Vault
- Former Location of Groundwater Extraction System Well/Vault
- Groundwater Extraction System Piezometer
- Catch Basin Discharge Points
- Meteorological Station
- HDPE Barrier Wall and Extraction Trench
- Grouted Section of HDPE Barrier Wall
- Surface/Building Air Monitoring Location
- Limit of Landfill Cap
- Approximate Extent of Solid Waste
- Sheet Pile Wall
- Storm Water Line
- Water Line
- Saltwater Line
- Steam Line
- Sanitary Sewer Line
- Electric Line
- Gas Line
- Fence Line
- Wetland (Surveyed in October 2001)
- Parcel Boundary
- Road
- Rail Line
- UCSF Property
- Non-Navy Property

Notes:

Methane concentrations are in percent by volume

DP	Discharge Point
EW	Groundwater extraction well
EV	Electrical vault
EX	Gas extraction well
GMP	Gas monitoring probe
HDPE	High-density polyethylene
IR	Installation Restoration
PV	Passive Vent
UCSF	University of California, San Francisco

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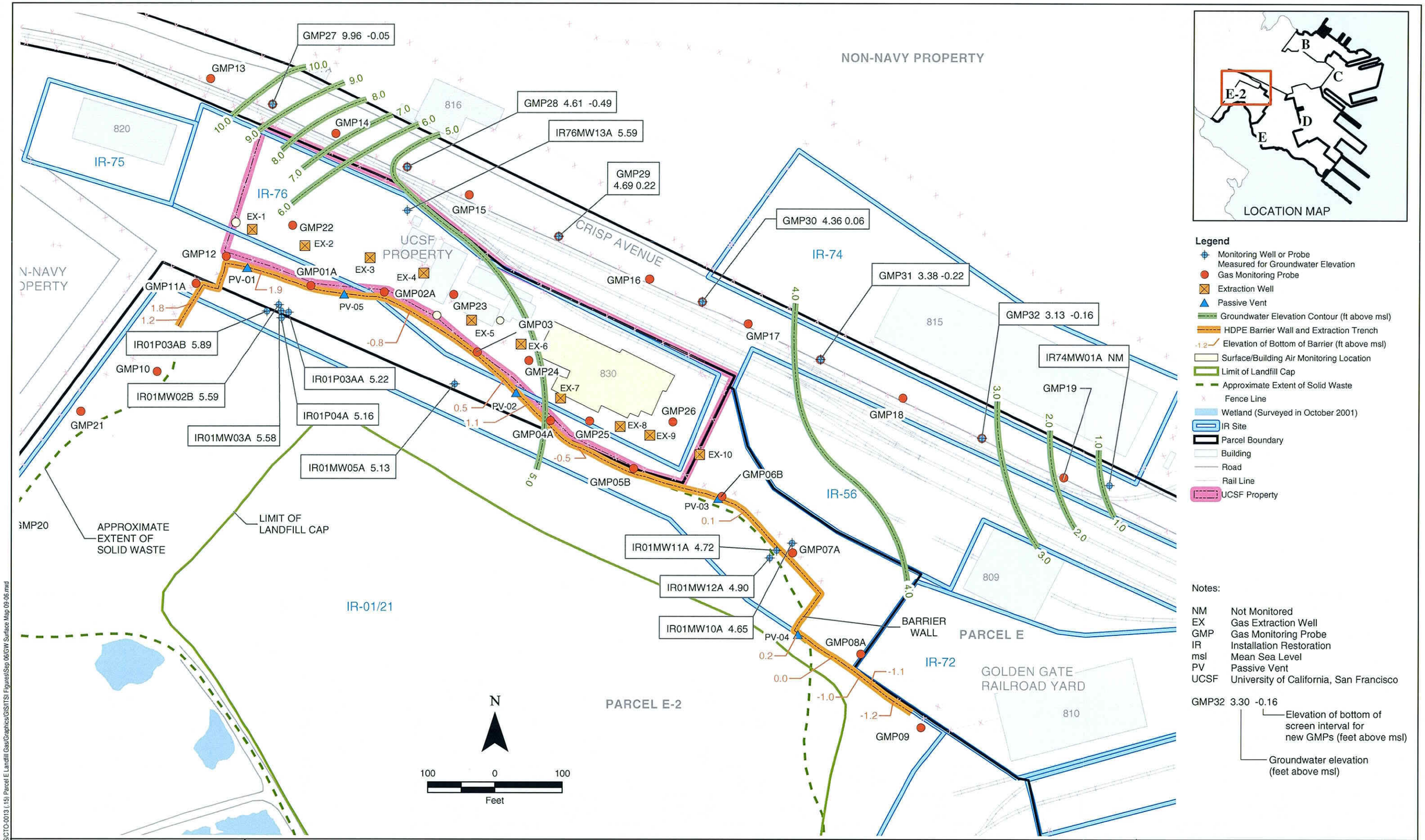
Monthly Landfill Gas Monitoring Report
Hunters Point Shipyard
San Francisco, California

FIGURE 4
Methane Concentrations at Ambient and Structural Locations
September 25, 2006

2002/02-125 Navy HPS/CTO-0013 (.15) Parcel E Landfill Gas/Graphics/GIS/ITSI Figures/Sep 06/Ambient_Structural Methane 9-06.mxd



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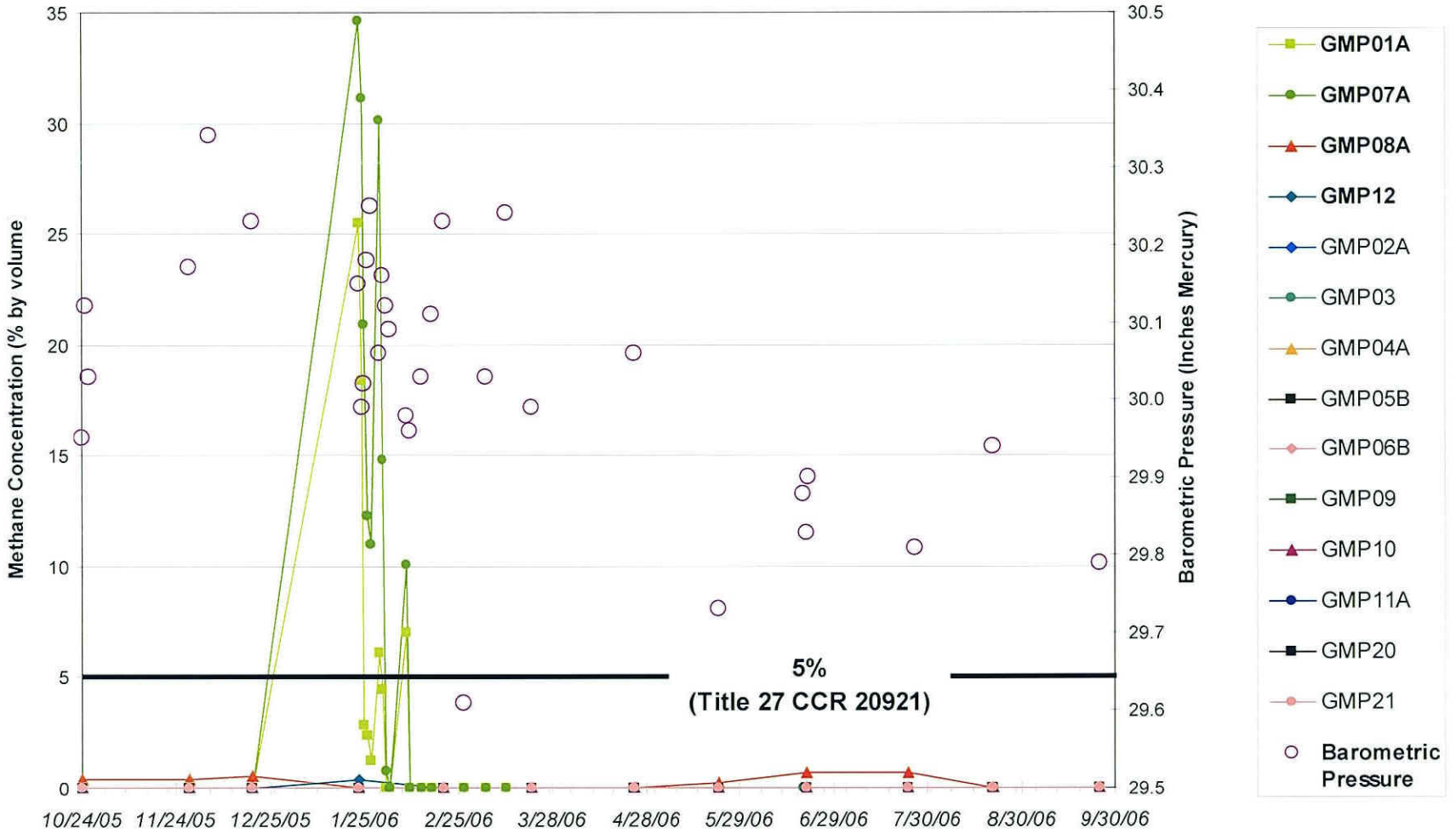
Monthly Landfill Gas Monitoring Report
Hunters Point Shipyard
San Francisco, California

FIGURE 5
Groundwater Potentiometric Surface Map
September 25, 2006

2002/02-125 Navy HPS/CTO-0013 (15) Parcel E Landfill Gas/Graphics/GIS/ITSI Figures/Sep 06/GW Surface Map 09-06.mxd



Notes: Periods of active gas extraction are specified in Section 2.2.1 of the report text. For each sampling date, the highest methane reading recorded at each sample point is displayed. GMPs with methane detections during the indicated interval are shown in bold. In addition to monthly monitoring results, data shown on this figure reflect followup and precautionary monitoring at GMP01A and GMP07A from January through March 2006.

27 CCR Title 27 of the California Code of Regulations

GMP Gas monitoring probe

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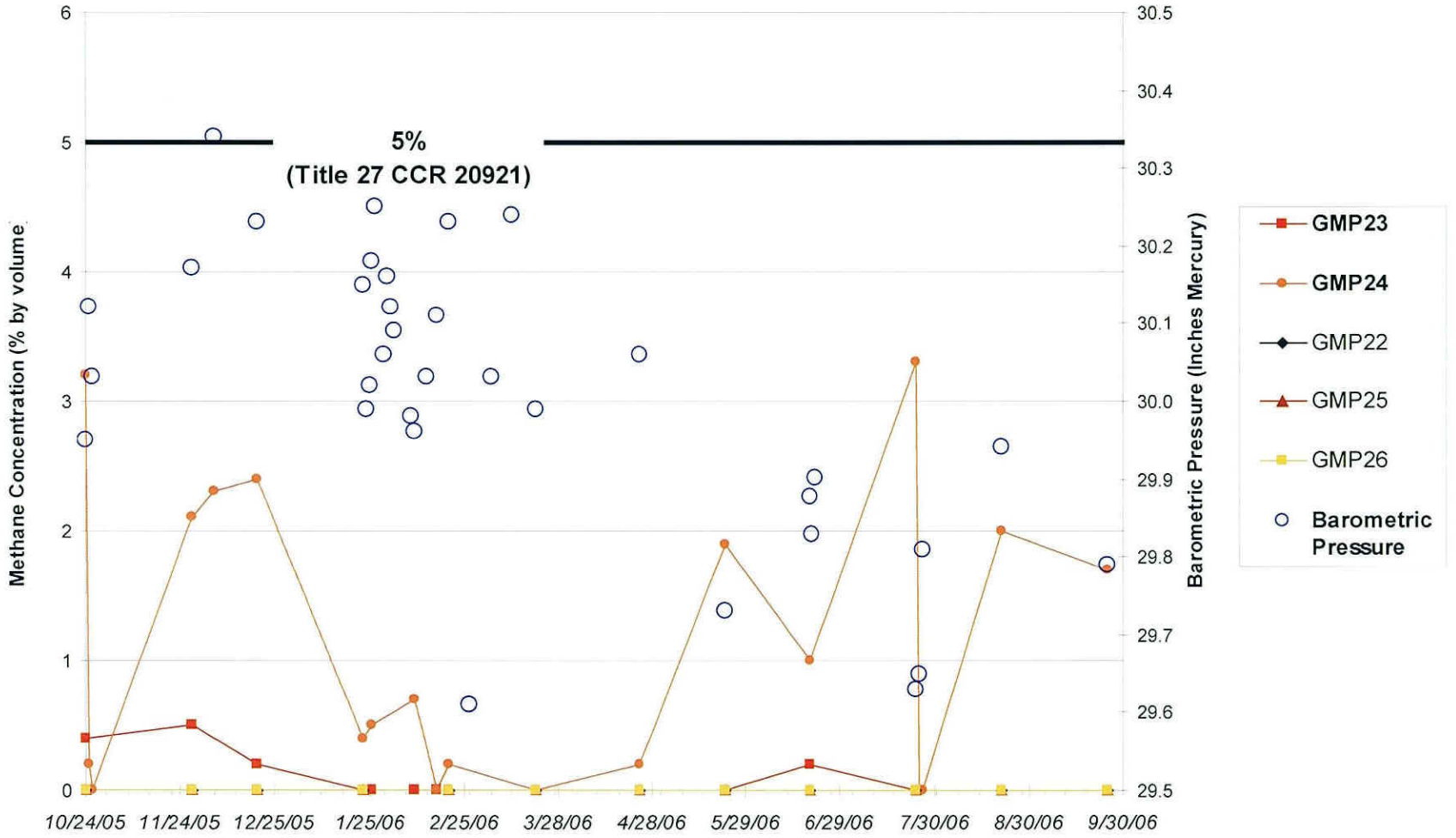
Monthly Landfill Gas Monitoring Report
Hunters Point Shipyard
San Francisco, California

FIGURE 6
Methane Concentrations and Barometric Pressures for GMPs at the Fence Line
October 2005 - September 2006

2002/02-125 Navy HPS/02-125.15 Parcel E Landfill Gas/Graphics/Monthly Reports/Sept. 06/Excel Chart 6 09-06.ai



Notes: Periods of active gas extraction are specified in Section 2.2.1 of the report text. GMPs with methane detections during the indicated interval are shown in bold. In addition to monthly monitoring results, data shown on this figure reflect follow-up and precautionary monitoring at GMP23 and GMP24 from October 2005 through July 2006. Followup and precautionary monitoring in October 2005, December 2005, and July 2006 were performed only at GMP24.

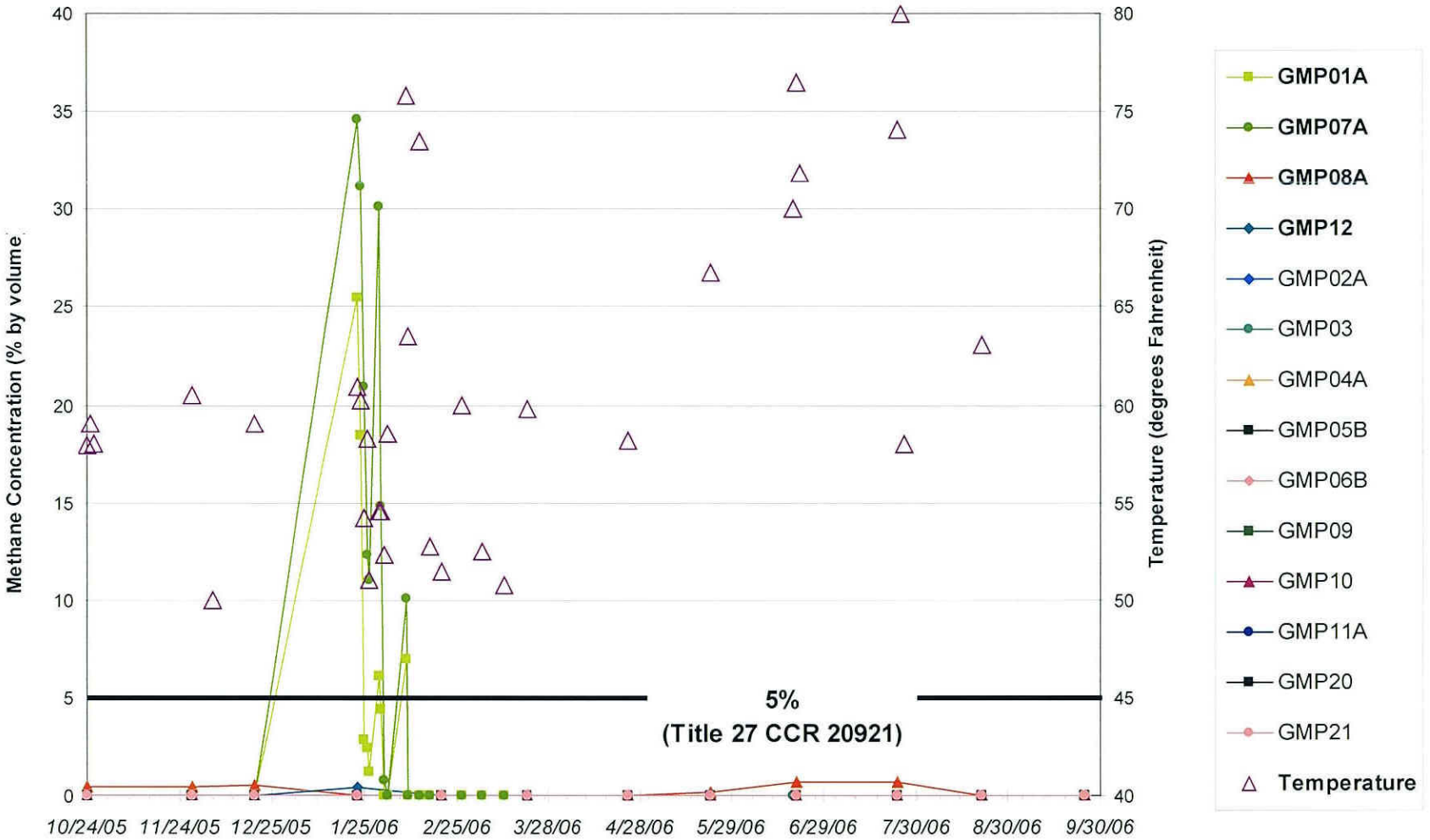
27 CCR Title 27 of the California Code of Regulations
GMP Gas monitoring probe
UCSF University of California, San Francisco

Innovative Technical Solutions, Inc.

Monthly Landfill Gas Monitoring Report
Hunters Point Shipyard
San Francisco, California

FIGURE 7
Methane Concentrations and Barometric Pressures for GMPs at the UCSF Compound
October 2005 - September 2006

2002/02-125 Navy HPS/02-125.15 Parcel E Landfill Gas/Graphics/Monthly Reports/Sept. 06/Excel Chart 7 09-06.ai



Notes: Periods of active gas extraction are specified in Section 2.2.1 of the report text. GMPs with methane detections during the indicated interval are shown in bold. For each sampling date, the highest methane reading recorded at each sample point is displayed. In addition to monthly monitoring results, data shown on this figure reflect followup and precautionary monitoring at GMP01A and GMP07A from January through March 2006.

27 CCR Title 27 of the California Code of Regulations
GMP Gas monitoring probe

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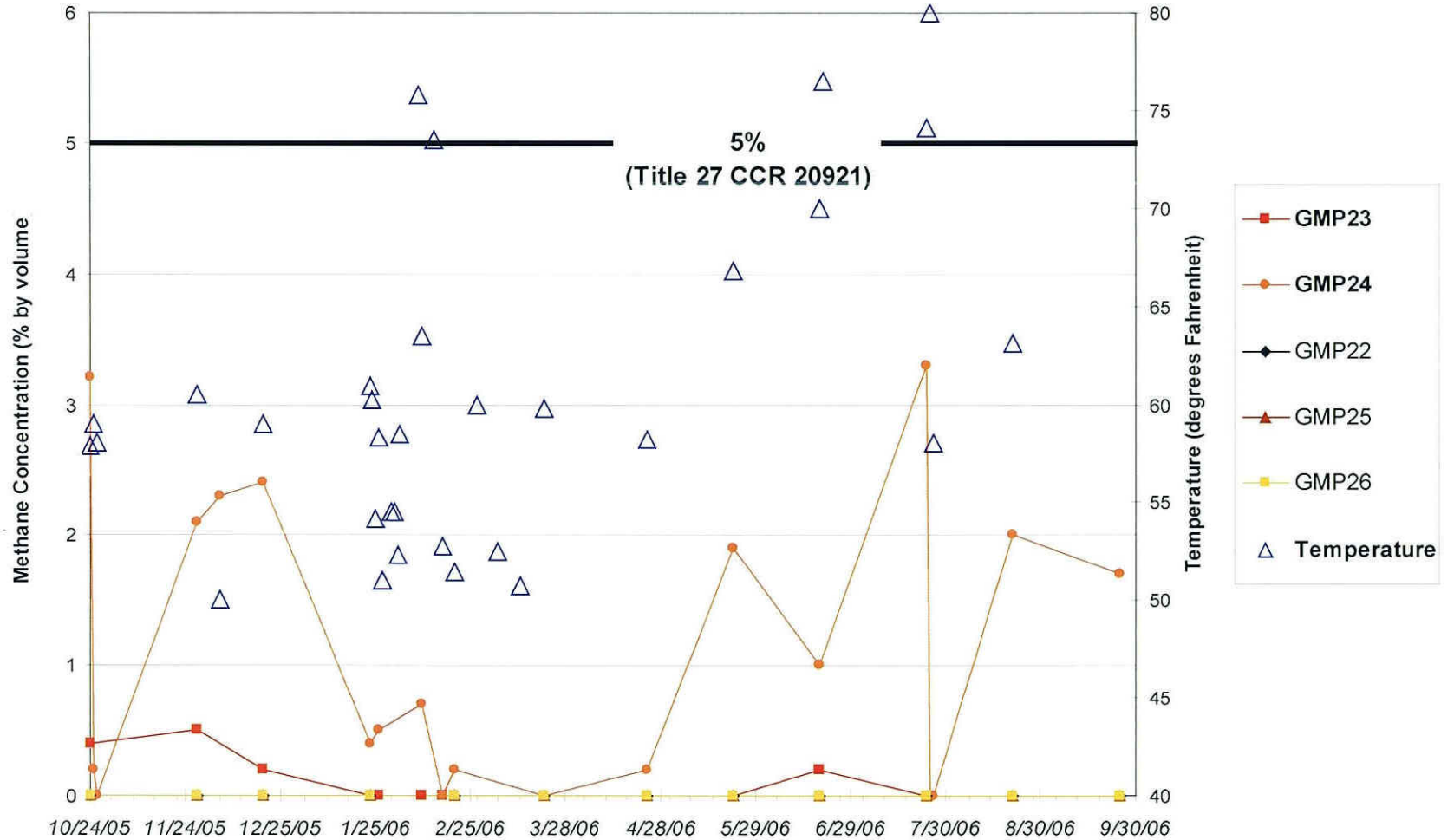
Monthly Landfill Gas Monitoring Report
Hunters Point Shipyard
San Francisco, California

FIGURE 8
Methane Concentrations and Temperatures for GMPs at the Fence Line
October 2005 - September 2006

2002/02-125 Navy HPS/02-125.15 Parcel E Landfill Gas/Graphics/Monthly Reports/Sept. 06/Excel Chart 8 09-06.ai



Notes: Periods of active gas extraction are specified in Section 2.2.1 of the report text. GMPs with methane detections during the indicated interval are shown in bold. In addition to monthly monitoring results, data shown on this figure reflect followup and precautionary monitoring at GMP23 and GMP24 from October 2005 through July 2006. Followup and precautionary monitoring in October 2005, December 2005, and July 2006 were performed only at GMP24.

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GMP Gas monitoring probe
UCSF University of California, San Francisco

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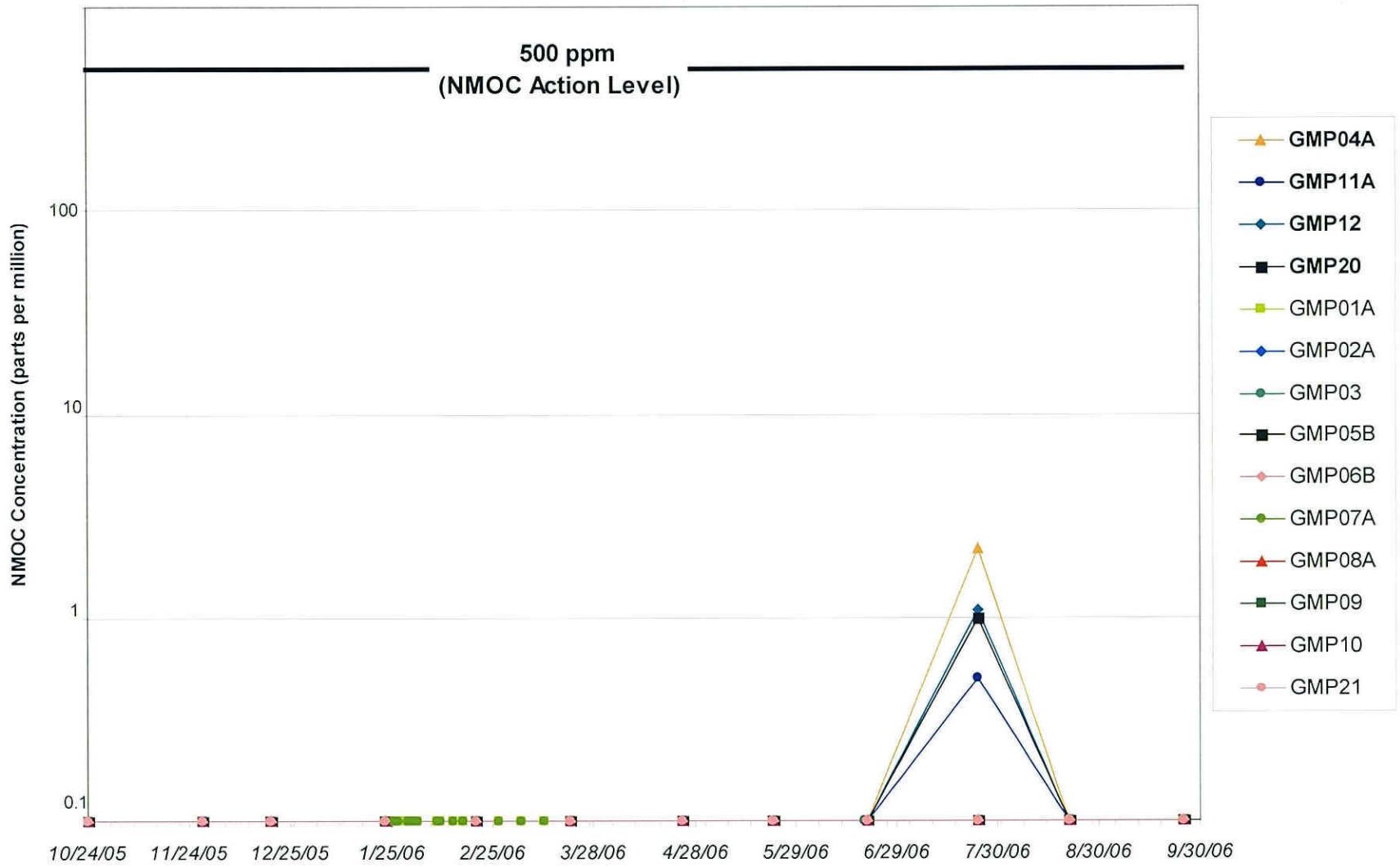
Monthly Landfill Gas Monitoring Report
Hunters Point Shipyard
San Francisco, California

FIGURE 9
Methane Concentrations and Temperatures for GMPs at the UCSF Compound
October 2005 - September 2006

2002/02-125 Navy HPS/02-125.15 Parcel E Landfill Gas/Graphics/Monthly Reports/Sept. 06/Excel Chart 9 09-06.ai



Notes: Periods of active gas extraction are specified in Section 2.2.1 of the report text. GMPs with NMOC detections above background during the indicated interval are shown in bold. In addition to monthly monitoring results, data shown on this figure reflect followup and precautionary monitoring at GMP01A and GMP07A from January through March 2006.

GMP Gas monitoring probe
NMOC Non-methane organic compound

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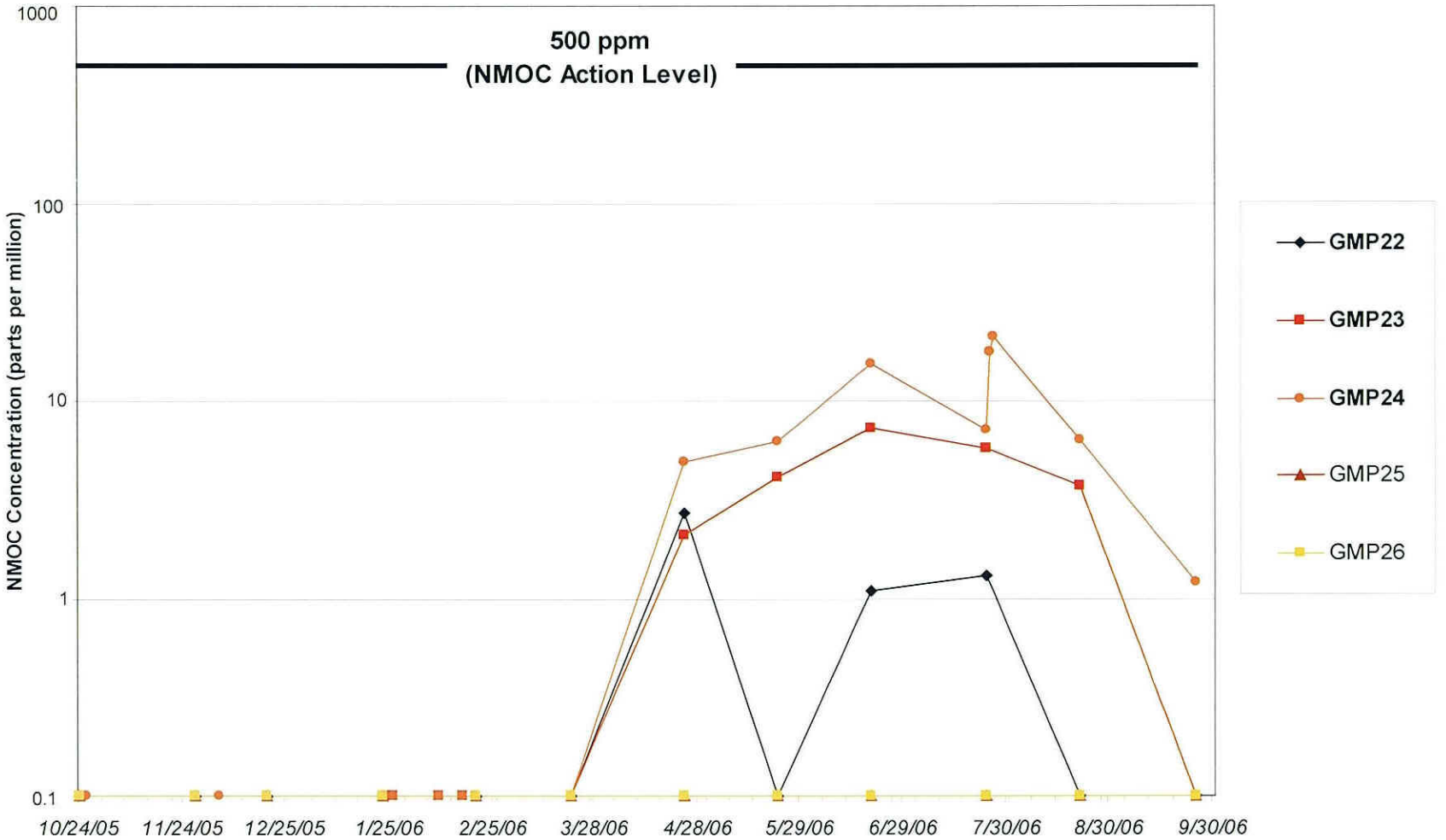
Monthly Landfill Gas Monitoring Report
Hunters Point Shipyard
San Francisco, California

FIGURE 10
NMOC Concentrations for GMPs at the Fence Line
October 2005 - September 2006

2002/02-125 Navy HPS/02-125.15 Parcel E Landfill Gas/Graphics/Monthly Reports/Sept. 06/Excel Chart 10 09-06.ai



Notes: Periods of active gas extraction are specified in Section 2.2.1 of the report text. GMPs with NMOC detections above background during the indicated interval are shown in bold. Results of followup and precautionary monitoring at GMP24 in October 2005, December 2005, and July 2006 are also shown.

GMP Gas monitoring probe
NMOC Non-methane organic compound

Innovative Technical Solutions, Inc.

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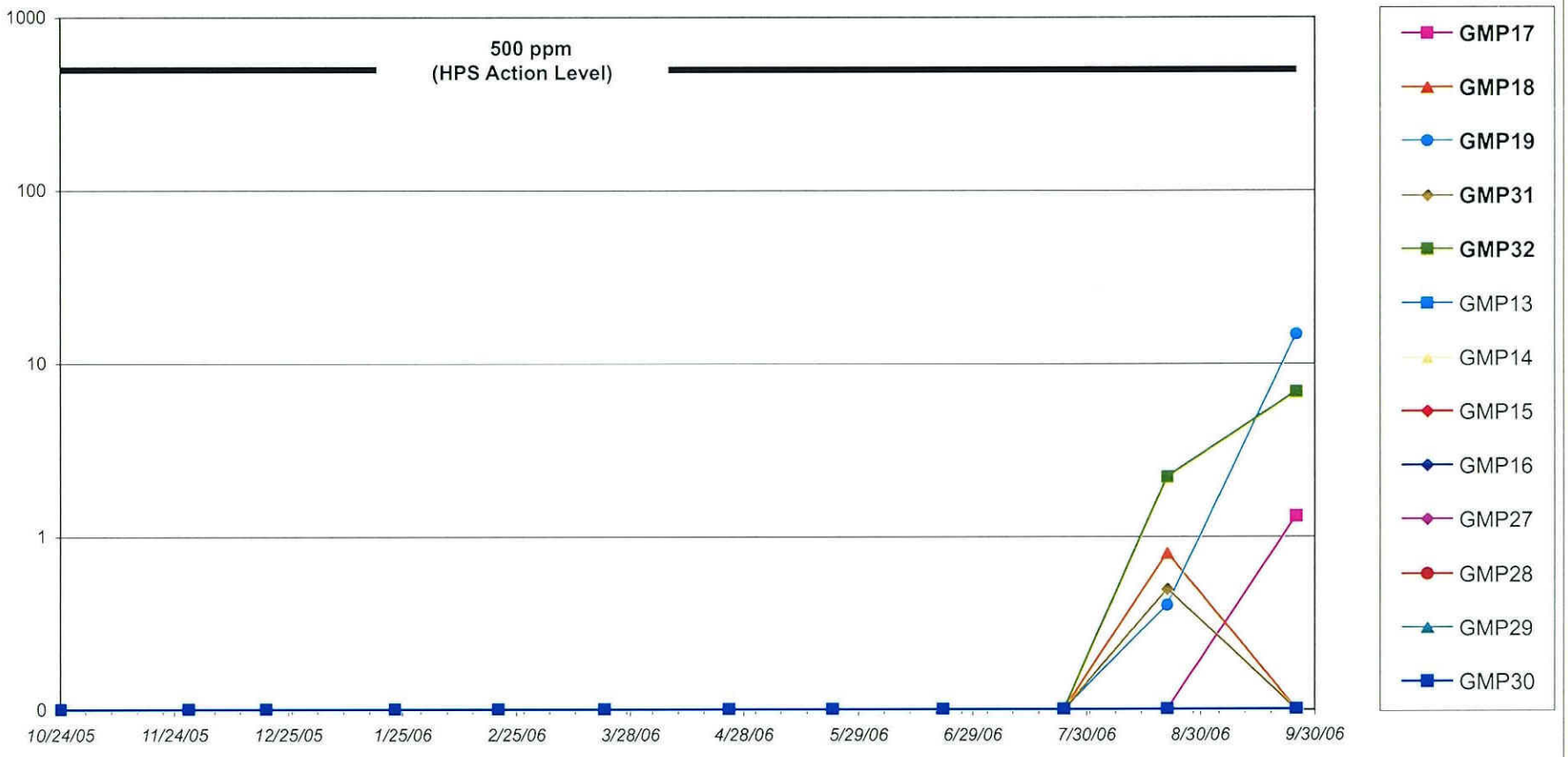
San Francisco, California

FIGURE 11
NMOC Concentrations for GMPs
at the UCSF Compound
October 2005 - September 2006

2002/02-125 Navy HPS/02-125.15 Parcel E Landfill Gas/Graphics/Monthly Reports/Sept. 06/Excel Chart 11 09-06.ai

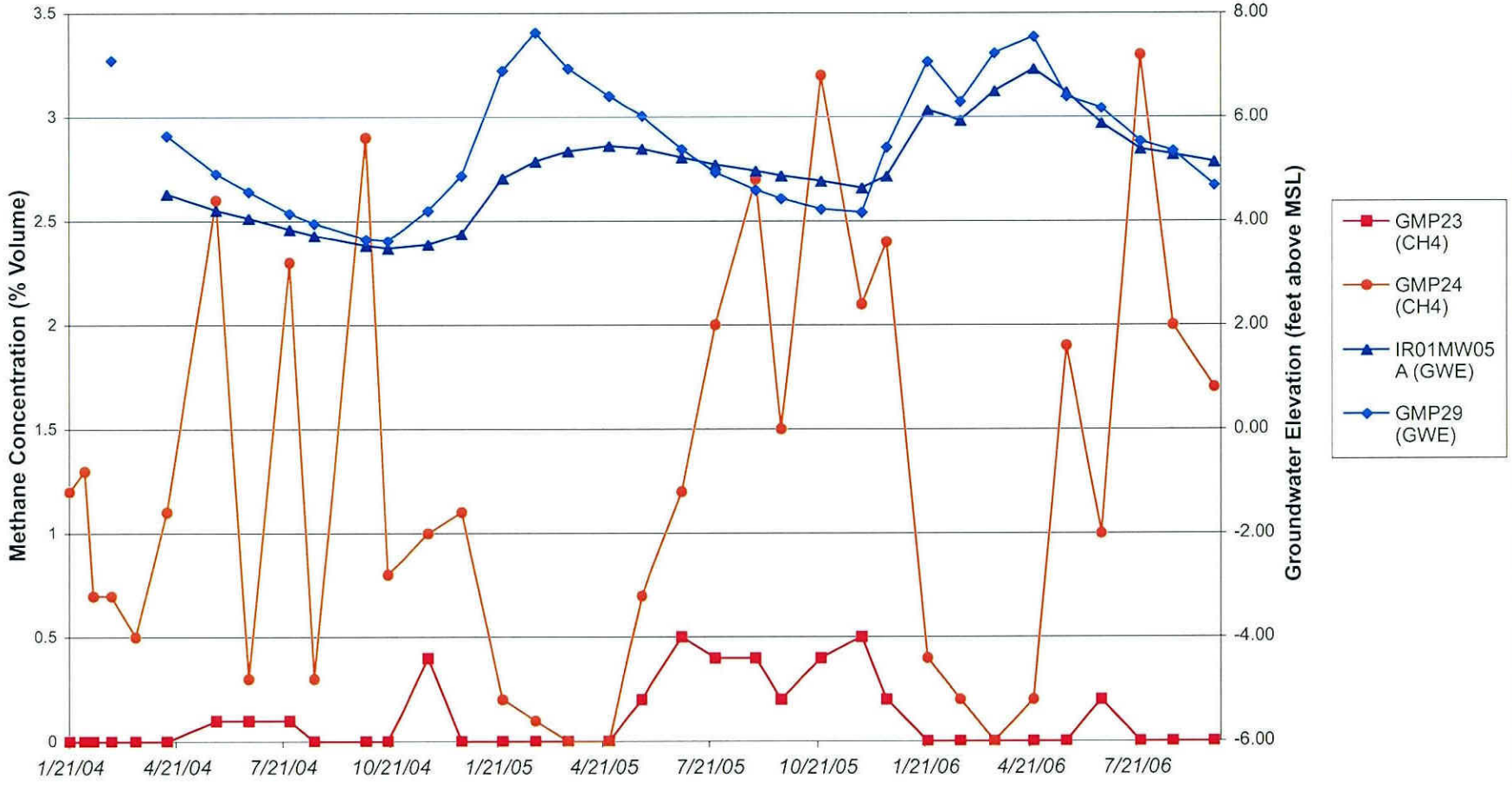


Notes: Periods of active gas extraction are specified in Section 2.2.1 of the report text. GMPs with NMOC detections above background during the indicated interval are shown in bold.

GMP Gas monitoring probe
NMOC Non-methane organic compound

Hunters Point Shipyard, San Francisco, California
U.S. Navy, Southwest Division, NAVFAC, San Diego

Figure 12
NMOC Concentrations for
GMPs on Crisp Avenue
October 2005–September 2006

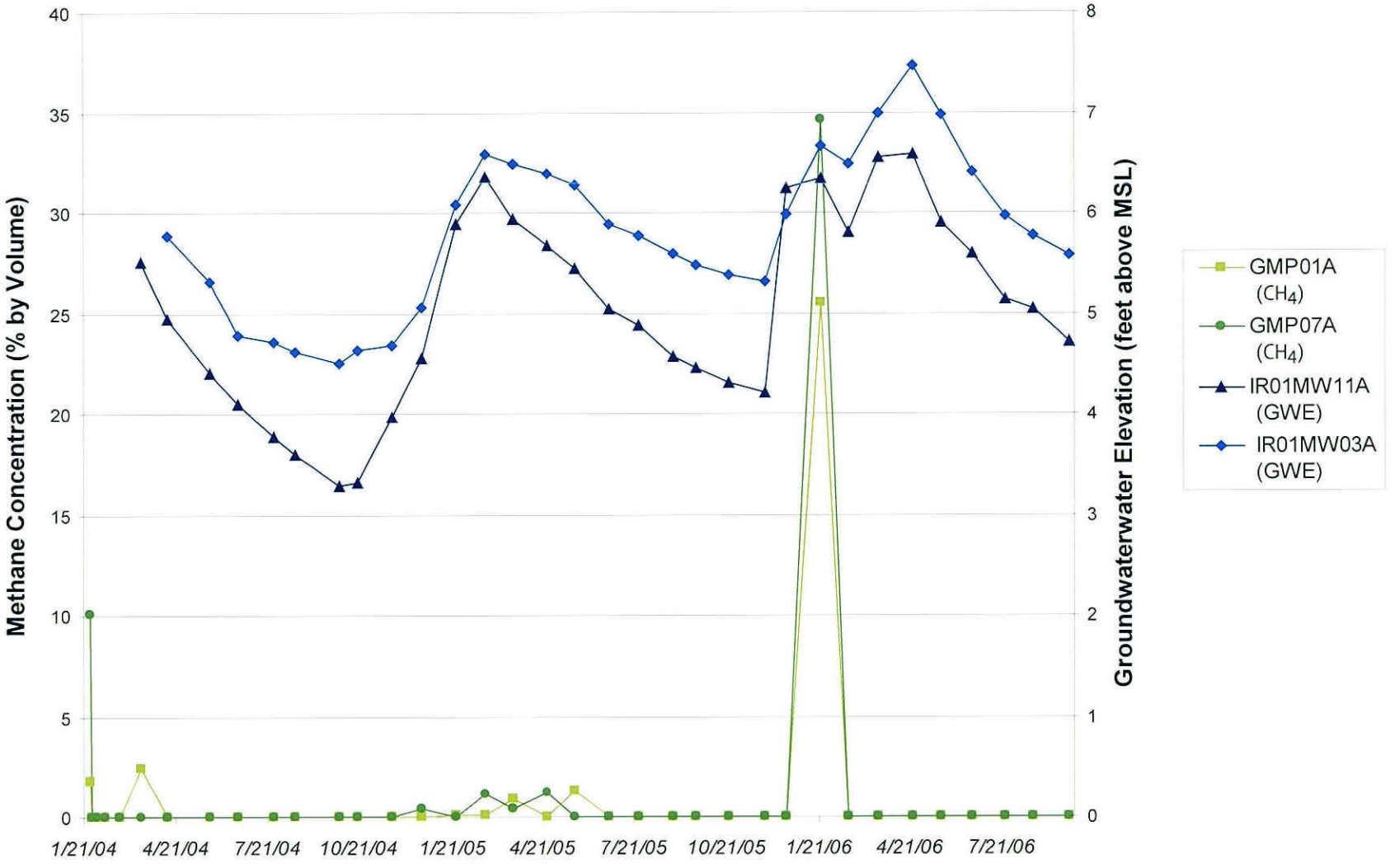


Notes: Groundwater elevations are shown in blue for the two groundwater monitoring locations nearest GMP23 and GMP24. Methane concentrations are shown in shades of red.

CH4 Methane
GWE Groundwater elevation, feet above mean sea level
GMP Gas monitoring probe

Hunters Point Shipyard, San Francisco, California
U.S. Navy, Southwest Division, NAVFAC, San Diego

Figure 13
Seasonal Patterns of Methane Concentrations
and Groundwater Elevations near GMP23 and GMP24
January 2004 - September 2006



Notes: Groundwater elevations are shown in blue for groundwater monitoring locations near GMP01A and GMP07A. Methane concentrations are shown in shades of green.

CH_4 - Methane
GWE - Groundwater elevation, feet above mean sea level
GMP - Gas monitoring probe

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FIGURE 14
Seasonal Patterns of Methane Concentrations and Groundwater Elevations near GMP01A and GMP07A
January 2004-September 2006

2002/02-125 Navy HPS/02-125.15 Parcel E Landfill Gas/Graphics/Monthly Reports/Sept. 06/Excel Chart 14 09-06.ai

APPENDIX A

LANDFILL GAS MONITORING LOGS AND WATER-LEVEL MONITORING LOGS

September 25-28, 2006 (monthly monitoring)

Landfill Gas Monitoring Log

Weather: Clear, hot

Name: B. Womack, S. Lovesy

Sampling Location		Date / Time of Measurement	Temp (°F)	Barometric Pressure (in. Hg)	GEM-2000				PID		Soil Gas Pressure (in. H_20)	Notes (e.g., active extraction, flow rate, probe damage, instrument issues)
Location ID	Description (for example, GMP, Well, Carbon, Hydrosil)				Methane (%)	CO_2 (%)	O_2 (%)	Percent of LEL	Non-Methane VOCs (ppm)	Bckgrd. NMOCs (ppm)		
IR01MW366A	Landfill Cap Well	9/25/2006 13:14	79	29.92	31.9	14.5	3.4	638	1.8	0.1	0	
IR01MWI-5	Landfill Cap Well	9/25/2006 13:23	80	29.88	62.7	29.4	1.3	1254	3.6	0.1	0	
IR01MW18A	Landfill Cap Well	9/25/2006 13:30	80	29.87	64.3	32.1	0	1286	0.8	0.1	0	
IR01MW16A	Landfill Cap Well	9/25/2006 13:36	93	29.86	55.4	27.8	2.8	1108	0.1	0.1	0	
GMP-20	Gas Monitoring Probe	9/25/2006 13:42	82	29.85	0	4.4	17.0	0	0.1	0.1	0	
GMP-21	Gas Monitoring Probe	9/25/2006 13:46	85	29.86	0	2.3	18.8	0	0.1	0.1	0	
GMP-10	Gas Monitoring Probe	9/25/2006 13:52	82	29.82	0	1.0	19.8	0	0.1	0.1	0	
GMP-11A	Gas Monitoring Probe	9/25/2006 13:57	88	29.82	0	5.5	14.4	0	0.1	0.1	0	
GMP-12	Gas Monitoring Probe	9/25/2006 13:59	82	29.80	0	6.0	14.2	0	0.1	0.1	0	
PV-01influent	Passive Sys. Influent	9/25/2006 14:02	84	29.80	47.5	25.4	2.6	950	0.1	0.1	NA	
PV-01carbon1	Passive Sys. 1st Carbon	9/25/2006 14:04	86	29.79	26.0	20.0	2.7	520	0.1	0.1	NA	
PV-01hydrosil	Passive Sys. Hydrosil	9/25/2006 14:06	84	29.79	5.0	12.1	10.7	100	0.1	0.1	NA	
GMP-01A	Gas Monitoring Probe	9/25/2006 14:10	86	29.78	0	5.8	13.1	0	0.1	0.1	0	
PV-05influent	Passive Sys. Influent	9/25/2006 14:12	81	29.79	27.9	22.2	7.8	558	2.3	0.1	NA	
PV-05carbon1	Passive Sys. 1st Carbon	9/25/2006 14:14	86	29.78	25.5	25.2	8.1	510	0.1	0.1	NA	
PV-05hydrosil	Passive Sys. Hydrosil	9/25/2006 14:16	83	29.77	15.0	8.6	14.1	300	0.1	0.1	NA	
GMP-02A	Gas Monitoring Probe	9/25/2006 14:21	90	29.76	0	12.0	3.7	0	0.1	0.1	0	
PV-02influent	Active Sys. Influent	9/25/2006 14:24	84	29.79	9.2	7.8	13.4	184	1.7	0.1	NA	Active ext. on
PV-02carbon1	Active Sys. 1st Carbon	9/25/2006 14:28	83	29.76	3.1	2.9	17.9	62	0.1	0.1	NA	Ext. trailer port
PV-02hydrosil	Active Sys. Hydrosil	9/25/2006 14:30	89	29.77	3.2	3.0	17.9	64	0.1	0.1	NA	Ext. trailer port
GMP-04A	Gas Monitoring Probe	9/25/2006 14:32	89	29.77	0	3.1	17.1	0	0.1	0.1	0	
GMP-05B	Gas Monitoring Probe	9/25/2006 14:36	85	29.76	0	3.9	15.1	0	0.1	0.1	0	
DP1	Drainage Catch Basin	9/25/2006 14:38	90	29.75	0	0	21.3	0	0.1	0.1	NA	

Landfill Gas Monitoring Log

Weather: Clear, hot

Name: B. Womack, S. Lovesy

Sampling Location					GEM-2000				PID			
Location ID	Description (for example, GMP, Well, Carbon, Hydrosil)	Date / Time of Measurement	Temp (°F)	Barometric Pressure (in. Hg)	Methane (%)	CO_2 (%)	O_2 (%)	Percent of LEL	Non-Methane VOCs (ppm)	Bckgrd. NMOCs (ppm)	Soil Gas Pressure (in. H_20)	Notes (e.g., active extraction, flow rate, probe damage, instrument issues)
PV-03influent	Passive Sys. Influent	9/25/2006 14:40	86	29.77	0	1.0	19.4	0	0.7	0.1	NA	
PV-03carbon1	Passive Sys. 1st Carbon	9/25/2006 14:42	96	29.75	0	3.7	18.0	0	0.1	0.1	NA	
PV-03hydrosil	Passive Sys. Hydrosil	9/25/2006 14:43	90	29.78	0	0.9	20.0	0	0.1	0.1	NA	
GMP-06B	Gas Monitoring Probe	9/25/2006 14:45	97	29.76	0	3.2	17.6	0	0.1	0.1	0	
DP2	Drainage Catch Basin	9/25/2006 14:47	91	29.79	0	0	21.4	0	0.1	0.1	NA	
GMP-07A	Gas Monitoring Probe	9/25/2006 14:49	91	29.75	0	4.9	11.6	0	0.1	0.1	0	
PV-04influent	Passive Sys. Influent	9/25/2006 14:51	90	29.75	60.1	34.7	0.3	1202	0.1	0.1	NA	
PV-04carbon1	Passive Sys. 1st Carbon	9/25/2006 14:53	90	29.75	57.9	33.7	0.4	1158	0.1	0.1	NA	
PV-04hydrosil	Passive Sys. Hydrosil	9/25/2006 14:55	90	29.74	60.7	27.8	0.6	1214	0.1	0.1	NA	
GMP-09	Gas Monitoring Probe	9/25/2006 14:58	91	29.75	0	2.3	17.8	0	0.1	0.1	0	
GMP-08A	Gas Monitoring Probe	9/25/2006 15:01	88	29.75	0	4.3	0.5	0	0.1	0.1	0	
GMP-19	Gas Monitoring Probe	9/25/2006 17:40	75	29.81	0	0.2	20.8	0	14.6	0.1	0	NMOC spike >350 ppm
GMP-32	Gas Monitoring Probe	9/25/2006 17:59	75	29.78	0	0.2	20.9	0	6.8	0.1	0	
GMP-18	Gas Monitoring Probe	9/28/2006 6:11	53	30.06	0	0.4	20.6	0	0.1	0.1	0	
GMP-31	Gas Monitoring Probe	9/25/2006 18:09	76	29.78	0	0	21.1	0	0.1	0.1	0	
GMP-17	Gas Monitoring Probe	9/25/2006 18:17	74	29.77	0	0.2	20.8	0	1.3	0.1	0	
GMP-30	Gas Monitoring Probe	9/25/2006 18:23	74	29.80	0	0.5	20.3	0	0.1	0.1	0	
GMP-16	Gas Monitoring Probe	9/25/2006 18:29	73	29.82	0	0	21.3	0	0.1	0.1	0	
GMP-29	Gas Monitoring Probe	9/25/2006 18:32	73	29.78	0	1.4	15.5	0	0.1	0.1	0	
GMP-15	Gas Monitoring Probe	9/25/2006 18:39	72	29.82	0	0.7	20.2	0	0.1	0.1	0	
GMP-28	Gas Monitoring Probe	9/25/2006 18:42	73	29.79	0	2.2	15.4	0	0.1	0.1	0	
GMP-14	Gas Monitoring Probe	9/25/2006 18:49	74	29.78	0	0.7	19.6	0	0.1	0.1	0	
GMP-27	Gas Monitoring Probe	9/25/2006 18:52	73	29.77	0	1.1	18.2	0	0.1	0.1	0	
GMP-13	Gas Monitoring Probe	9/25/2006 18:56	74	29.78	0	0.2	21.0	0	0.1	0.1	0	
GMP-22	Gas Monitoring Probe	9/25/2006 15:28	91	29.77	0	11.5	4.9	0	0.1	0.1	0	
GMP-23	Gas Monitoring Probe	9/25/2006 15:32	93	29.78	0	14.1	3.3	0	0.1	0.1	0	
GMP-03	Gas Monitoring Probe	9/25/2006 15:35	94	29.74	0	9.7	8.4	0	0.1	0.1	0	

Landfill Gas Monitoring Log

Weather: Clear, hot

Name: B. Womack, S. Lovesy

Sampling Location		Date / Time of Measurement	Temp (°F)	Barometric Pressure (in. Hg)	GEM-2000				PID		Soil Gas Pressure (in. H_20)	Notes (e.g., active extraction, flow rate, probe damage, instrument issues)
Location ID	Description (for example, GMP, Well, Carbon, Hydrosil)				Methane (%)	CO_2 (%)	O_2 (%)	Percent of LEL	Non-Methane VOCs (ppm)	Bckgrd. NMOCs (ppm)		
830crawlspace	Bldg. 830 Ambient	9/25/2006 15:36	89	29.74	0	0	21.2	0	0.1	0.1	NA	
GMP-24	Gas Monitoring Probe	9/25/2006 15:40	92	29.75	1.7	13.8	0.3	34	1.2	0.1	0	
GMP-25	Gas Monitoring Probe	9/25/2006 15:44	92	29.76	0	11.4	0.9	0	0.1	0.1	0	
GMP-26	Gas Monitoring Probe	9/25/2006 15:46	88	29.76	0	2.6	13.8	0	0.1	0.1	0	

Legend:

%	percent by volume
°F	degrees Fahrenheit
CO_2	carbon dioxide
GEM-2000	CES-LANDTEC landfill gas meter
in. Hg	inches of mercury
in. H_20	inches of water
LEL	lower explosive limit
NA	not applicable
NMOC	non-methane organic compound
O_2	oxygen
PID	photoionization detector
ppm	parts per million
VOC	volatile organic compound

Water Level Monitoring Log

Name: B. Womack, S. Lovesy

Weather: clear, hot

Date: 9/25/06

Location ID	Description (for example, GMP / Well / Carbon / Hydrosil)	Time	Water Level (feet below top of casing)	Notes (e.g., active extraction location, flow rate, probe damage, instrument issues, etc.):
IR01MW02B	Well	1508	15.02	
IR01MW03A	Well	1509	14.31	
IR01P03AA	Well	1510	16.64	
IR01P04A	Well	1511	16.45	
IR01P03AB	Well	1512	13.98	
IR01MW05A	Well	1514	17.43	
IR01MW12A	Well	1516	13.35	
IR01MW11A	Well	1517	13.24	
IR01MW10A	Well	1519	9.10	
IR74MW01A	Well	NA	NA	Well is trench-plated.
GMP-32	Gas Monitoring Probe	1801	10.89	
GMP-31	Gas Monitoring Probe	1812	11.96	
GMP-30	Gas Monitoring Probe	1826	12.26	
GMP-29	Gas Monitoring Probe	1835	13.79	
GMP-28	Gas Monitoring Probe	1845	15.56	
GMP-27	Gas Monitoring Probe	1855	11.70	
IR76MW13A	Well	1536	14.10	

APPENDIX B

OTHER MONITORING RESULTS

TABLE B-1: METHANE, NMOC, OXYGEN, AND CARBON DIOXIDE CONCENTRATIONS AT OTHER LOCATIONS, SEPTEMBER 25, 2006

Monthly Landfill Gas Monitoring Report for September 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

Location	Methane (% by volume)	NMOC (ppm by volume)	Oxygen (% by volume)	Carbon Dioxide (% by volume)
IR01MW16A *	55.4	0.1	2.8	27.8
IR01MW18A *	64.3	0.8	0.0	32.1
IR01MW366A *	31.9	1.8	3.4	14.5
IR01MWI-5 *	62.7	3.6	1.3	29.4

Notes:

*	The regulatory limit of 5% methane does not apply to these monitoring wells, which are located on the landfill.
IR	Installation Restoration
MW	Monitoring well
NMOC	Non-methane organic compounds
ppm	parts per million
%	percent